CLAIMS:

1. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least one portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

controlling the heat from the one or more heat sources such that an average temperature within at least a majority of the selected section of the formation is less than about 375 °C; and

producing a mixture from the formation.

2. The method of claim 1, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some coal within the selected section of the formation.

3. The method of claim 1, wherein controlling formation conditions comprises maintaining a temperature within the selected section within a pyrolysis temperature range.

4. The method of claim 1, wherein the one or more heat sources comprise electrical heaters.

5. The method of claim 1, wherein the one or more heat sources comprise surface burners.

6. The method of claim 1, wherein the one or more heat sources comprise flameless distributed combustors.

7. The method of claim 1, wherein the one or more heat sources comprise natural distributed combustors.

8. The method of claim 1, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

9. The method of claim 1, further comprising controlling a pressure within at least a majority of the selected section of the formation with a valve coupled to at least one of the one or more heat sources.

10. The method of claim 1, further comprising controlling a pressure within at least a majority of the selected section of the formation with a valve coupled to a production well located in the formation.

11. The method of claim 1, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

12. The method of claim 1, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity(C_v), and wherein the heating pyrolyzes at least some coal within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

13. The method of claim 1, wherein allowing the heat to transfer from the one or more heat sources to the selected section comprises transferring heat substantially by conduction.

14. The method of claim 1, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

15. The method of claim 1, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

16. The method of claim 1, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

17. The method of claim 1, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

18. The method of claim 1, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

19. The method of claim 1, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

20. The method of claim 1, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

21. The method of claim 1. wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

22. The method of claim 1, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

23. The method of claim 1, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

24. The method of claim 1, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

25. The method of claim 1, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

26. The method of claim 1, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

27. The method of claim 1, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

28. The method of claim 1, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

29. The method of claim 1, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

30. The method of claim 1, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

31. The method of claim 1, further comprising controlling formation conditions such that the produced mixture comprises a partial pressure of H_2 within the mixture greater than about 0.5 bar.

32. The method of claim 31, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

33. The method of claim 1, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

34. The method of claim 1, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

35. The method of claim 1, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

36. The method of claim 1, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

37. The method of claim 1, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

38. The method of claim 1, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

39. The method of claim 1, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

40. The method of claim 1, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

41. The method of claim 1, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

42. The method of claim 1, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

43. The method of claim 1, further comprising separating the produced mixture into a gas stream and a liquid stream.

44. The method of claim 1, further comprising separating the produced mixture into a gas stream and a liquid stream and separating the liquid stream into an aqueous stream and a non-aqueous stream.

45. The method of claim 1, wherein the produced mixture comprises H_2S, the method further comprising separating a portion of the H_2S from non-condensable hydrocarbons.

46. The method of claim 1, wherein the produced mixture comprises CO_2, the method further comprising separating a portion of the CO_2 from non-condensable hydrocarbons.

47. The method of claim 1, wherein the mixture is produced from a production well, wherein the heating is controlled such that the mixture can be produced from the formation as a vapor.

48. The method of claim 1, wherein the mixture is produced from a production well, the method further comprising heating a wellbore of the production well to inhibit condensation of the mixture within the wellbore.

49. The method of claim 1, wherein the mixture is produced from a production well, wherein a wellbore of the production well comprises a heater element configured to heat the formation adjacent to the wellbore, and further comprising heating the formation with the heater element to produce the mixture, wherein the mixture comprises a large non-condensable hydrocarbon gas component and H_2.

50. The method of claim 1, wherein the minimum pyrolysis temperature is about 270 °C.

51. The method of claim 1, further comprising maintaining the pressure within the formation above about 2.0 bar absolute to inhibit production of fluids having carbon numbers above 25.

52. The method of claim 1, further comprising controlling pressure within the formation in a range from about atmospheric pressure to about 100 bar, as measured at a wellhead of a production well, to control an amount of condensable hydrocarbons within the produced mixture, wherein the pressure is reduced to increase production of condensable hydrocarbons, and wherein the pressure is increased to increase production of non-condensable hydrocarbons.

53. The method of claim 1, further comprising controlling pressure within the formation in a range from about atmospheric pressure to about 100 bar, as measured at a wellhead of a production well, to control an API gravity of condensable hydrocarbons within the produced mixture, wherein the pressure is reduced to decrease the API gravity, and wherein the pressure is increased to reduce the API gravity.

54. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from at least the portion to a selected section of the formation substantially by conduction of heat;

pyrolyzing at least some hydrocarbons within the selected section of the formation; and

producing a mixture from the formation.

55. The method of claim 54, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

56. The method of claim 54, wherein the one or more heat sources comprise electrical heaters.

57. The method of claim 54, wherein the one or more heat sources comprise surface burners.

58. The method of claim 54, wherein the one or more heat sources comprise flameless distributed combustors.

59. The method of claim 54, wherein the one or more heat sources comprise natural distributed combustors.

60. The method of claim 54, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

61. The method of claim 54, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1.0 ° C per day during pyrolysis.

62. The method of claim 54, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than *Pwr*, wherein *Pwr* is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein *Pwr* is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

63. The method of claim 54, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

64. The method of claim 54, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

65. The method of claim 54, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

66. The method of claim 54, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

67. The method of claim 54, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

68. The method of claim 54, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

69. The method of claim 54, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

70. The method of claim 54, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

71. The method of claim 54, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

72. The method of claim 54, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

73. The method of claim 54, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

74. The method of claim 54, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

75. The method of claim 54, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

76. The method of claim 54, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

77. The method of claim 54, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

78. The method of claim 54, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

79. The method of claim 54, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

80. The method of claim 79, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

81. The method of claim 54, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

82. The method of claim 54, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

83. The method of claim 54, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

84. The method of claim 54, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

85. The method of claim 54, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

86. The method of claim 54, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

87. The method of claim 54, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

88. The method of claim 54, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

89. The method of claim 54, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

90. The method of claim 54, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

91. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation; and

heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

92. The method of claim 91, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

93. The method of claim 91, wherein controlling formation conditions comprises maintaining a temperature within the selected section within a pyrolysis temperature range.

94. The method of claim 91, wherein the one or more heat sources comprise electrical heaters.

95. The method of claim 91, wherein the one or more heat sources comprise surface burners.

96. The method of claim 91, wherein the one or more heat sources comprise flameless distributed combustors.

97. The method of claim 91, wherein the one or more heat sources comprise natural distributed combustors.

98. The method of claim 91, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

99. The method of claim 91, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

100. The method of claim 91, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

101. The method of claim 91, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

102. The method of claim 91, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

103. The method of claim 91, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

104. The method of claim 91, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

105. The method of claim 91, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

106. The method of claim 91, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

107. The method of claim 91, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

108. The method of claim 91, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

109. The method of claim 91, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

110. The method of claim 91, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

111. The method of claim 91, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

112. The method of claim 91, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

113. The method of claim 91, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

114. The method of claim 91, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

115. The method of claim 91, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

116. The method of claim 91, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

117. The method of claim 91, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

118. The method of claim 117, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

119. The method of claim 91, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

120. The method of claim 91, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

121. The method of claim 91, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

122. The method of claim 91, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

123. The method of claim 91, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

124. The method of claim 91, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

125. The method of claim 91, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

126. The method of claim 91, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

127. The method of claim 91, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

128. The method of claim 91, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

129. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

controlling the heat from the one or more heat sources such that an average temperature within at least a majority of the selected section of the formation is less than about 370 °C such that production of a substantial amount of hydrocarbons having carbon numbers greater than 25 is inhibited;

controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least 2.0 bar; and

producing a mixture from the formation, wherein about 0.1 % by weight of the produced mixture to about 15 % by weight of the produced mixture are olefins, and wherein an average carbon number of the produced mixture ranges from 1-25.

130. The method of claim 129, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

131. The method of claim 129, wherein controlling formation conditions comprises maintaining a temperature within the selected section within a pyrolysis temperature range.

132. The method of claim 129, wherein the one or more heat sources comprise electrical heaters.

133. The method of claim 129, wherein the one or more heat sources comprise surface burners.

134. The method of claim 129, wherein the one or more heat sources comprise flameless distributed combustors.

135. The method of claim 129, wherein the one or more heat sources comprise natural distributed combustors.

136. The method of claim 129, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

137. The method of claim 129, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

138. The method of claim 129, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (*V*) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than *Pwr*, wherein *Pwr* is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein *Pwr* is the heating energy/day, *h* is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

139. The method of claim 129, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

140. The method of claim 129, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

141. The method of claim 129, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

142. The method of claim 129, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

143. The method of claim 129, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

144. The method of claim 129, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

145. The method of claim 129, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

146. The method of claim 129, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

147. The method of claim 129, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

148. The method of claim 129, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

149. The method of claim 129, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

150. The method of claim 129, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

151. The method of claim 129, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

152. The method of claim 129, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

153. The method of claim 129, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

154. The method of claim 129, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

155. The method of claim 154, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

156. The method of claim 129, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

157. The method of claim 129, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

158. The method of claim 129, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

159. The method of claim 129, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

160. The method of claim 129, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

161. The method of claim 129, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

162. The method of claim 129, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

163. The method of claim 129, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

164. The method of claim 129, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

165. The method of claim 129, further comprising separating the produced mixture into a gas stream and a liquid stream.

166. The method of claim 129, further comprising separating the produced mixture into a gas stream and a liquid stream and separating the liquid stream into an aqueous stream and a non-aqueous stream.

167. The method of claim 129, wherein the produced mixture comprises H_2S, the method further comprising separating a portion of the H_2S from non-condensable hydrocarbons.

168. The method of claim 129, wherein the produced mixture comprises CO_2, the method further comprising separating a portion of the CO_2 from non-condensable hydrocarbons.

169. The method of claim 129, wherein the mixture is produced from a production well, wherein the heating is controlled such that the mixture can be produced from the formation as a vapor.

170. The method of claim 129, wherein the mixture is produced from a production well, the method further comprising heating a wellbore of the production well to inhibit condensation of the mixture within the wellbore.

171. The method of claim 129, wherein the mixture is produced from a production well, wherein a wellbore of the production well comprises a heater element configured to heat the formation adjacent to the wellbore, and further comprising heating the formation with the heater element to produce the mixture, wherein the produced mixture comprise a large non-condensable hydrocarbon gas component and H_2.

172. The method of claim 129, wherein the minimum pyrolysis temperature is about 270 °C.

173. The method of claim 129, further comprising maintaining the pressure within the formation above about 2.0 bar absolute to inhibit production of fluids having carbon numbers above 25.

174. The method of claim 129, further comprising controlling pressure within the formation in a range from about atmospheric pressure to about 100 bar absolute, as measured at a wellhead of a production well, to control an amount of condensable fluids within the produced mixture, wherein the pressure is reduced to increase production of condensable fluids, and wherein the pressure is increased to increase production of non-condensable fluids.

175. The method of claim 129, further comprising controlling pressure within the formation in a range from about atmospheric pressure to about 100 bar absolute, as measured at a wellhead of a production well, to control an API gravity of condensable fluids within the produced mixture, wherein the pressure is reduced to decrease the API gravity, and wherein the pressure is increased to reduce the API gravity.

176. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute; and

producing a mixture from the formation.

177. The method of claim 176, wherein controlling the pressure comprises controlling the pressure with a valve coupled to at least one of the one or more heat sources.

178. The method of claim 176, wherein controlling the pressure comprises controlling the pressure with a valve coupled to a production well located in the formation.

179. The method of claim 176, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

180. The method of claim 176, wherein controlling formation conditions comprises maintaining a temperature within the selected section within a pyrolysis temperature range.

181. The method of claim 176, wherein the one or more heat sources comprise electrical heaters.

182. The method of claim 176, wherein the one or more heat sources comprise surface burners.

183. The method of claim 176, wherein the one or more heat sources comprise flameless distributed combustors.

184. The method of claim 176, wherein the one or more heat sources comprise natural distributed combustors.

185. The method of claim 176, further comprising controlling a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

186. The method of claim 176, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

187. The method of claim 176, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

188. The method of claim 176, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

189. The method of claim 176, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

190. The method of claim 176, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

191. The method of claim 176, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

192. The method of claim 176, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

193. The method of claim 176, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

194. The method of claim 176, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

195. The method of claim 176, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

196. The method of claim 176, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

197. The method of claim 176, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

198. The method of claim 176, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

199. The method of claim 176, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

200. The method of claim 176, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

201. The method of claim 176, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

202. The method of claim 176, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

203. The method of claim 176, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

204. The method of claim 176, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

205. The method of claim 204, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

206. The method of claim 176, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

207. The method of claim 176, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

208. The method of claim 176, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

209. The method of claim 176, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

210. The method of claim 176, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

211. The method of claim 176, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

212. The method of claim 176, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

213. The method of claim 176, wherein producing the mixture from the formation comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

214. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation; and

controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute;

controlling the heat from the one or more heat sources such that an average temperature within at least a majority of the selected section of the formation is less than about 375 °C; and

producing a mixture from the formation.

215. The method of claim 214, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

216. The method of claim 214, wherein controlling formation conditions comprises maintaining a temperature within the selected section within a pyrolysis temperature range.

217. The method of claim 214, wherein the one or more heat sources comprise electrical heaters.

218. The method of claim 214, wherein the one or more heat sources comprise surface burners.

219. The method of claim 214, wherein the one or more heat sources comprise flameless distributed combustors.

220. The method of claim 214, wherein the one or more heat sources comprise natural distributed combustors.

221. The method of claim 214, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

222. The method of claim 214, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

223. The method of claim 214, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

224. The method of claim 214, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

225. The method of claim 214, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

226. The method of claim 214, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

227. The method of claim 214, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

228. The method of claim 214, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

229. The method of claim 214, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

230. The method of claim 214, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

231. The method of claim 214, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

232. The method of claim 214, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

233. The method of claim 214, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

234. The method of claim 214, wherein the produced mixture comprises condensable hydrocarbons. and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

235. The method of claim 214, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

236. The method of claim 214, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

237. The method of claim 214, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

238. The method of claim 214, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

239. The method of claim 214, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

240. The method of claim 214, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

241. The method of claim 214, wherein controlling the heat further comprises controlling the heat such that coke production is inhibited.

242. The method of claim 214, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

243. The method of claim 242, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

244. The method of claim 214, further comprising altering the pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

245. The method of claim 214, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

246. The method of claim 214, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

247. The method of claim 214, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

248. The method of claim 214, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

249. The method of claim 214, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

250. The method of claim 214, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

251. The method of claim 214, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

252. The method of claim 214, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

253. The method of claim 214, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

254. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

producing a mixture from the formation, wherein at least a portion of the mixture is produced during the pyrolysis and the mixture moves through the formation in a vapor phase; and

maintaining a pressure within at least a majority of the selected section above about 2.0 bar absolute.

255. The method of claim 254, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

256. The method of claim 254, wherein controlling formation conditions comprises maintaining a temperature within the selected section within a pyrolysis temperature range.

257. The method of claim 254, wherein the one or more heat sources comprise electrical heaters.

258. The method of claim 254, wherein the one or more heat sources comprise surface burners.

259. The method of claim 254, wherein the one or more heat sources comprise flameless distributed combustors.

260. The method of claim 254, wherein the one or more heat sources comprise natural distributed combustors.

261. The method of claim 254, further comprising controlling the pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

262. The method of claim 254, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

263. The method of claim 254, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than *Pwr*, wherein *Pwr* is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein *Pwr* is the heating energy/day, *h* is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

264. The method of claim 254, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

265. The method of claim 254, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

266. The method of claim 254, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

267. The method of claim 254, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

268. The method of claim 254, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

269. The method of claim 254, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

270. The method of claim 254, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

271. The method of claim 254, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

272. The method of claim 254, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

273. The method of claim 254, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

274. The method of claim 254, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

275. The method of claim 254, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

276. The method of claim 254, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

277. The method of claim 254, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

278. The method of claim 254, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

279. The method of claim 254, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

280. The method of claim 254, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

281. The method of claim 254, wherein the pressure is measured at a wellhead of a production well.

282. The method of claim 254, wherein the pressure is measured at a location within a wellbore of the production well.

283. The method of claim 254, wherein the pressure is maintained below about 100 bar absolute.

284. The method of claim 254, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

285. The method of claim 284, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

286. The method of claim 254, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

287. The method of claim 254, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

288. The method of claim 254, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

289. The method of claim 254, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

290. The method of claim 254, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

291. The method of claim 254, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

292. The method of claim 254, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

293. The method of claim 254, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

294. The method of claim 254, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

295. The method of claim 254, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

296. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

maintaining a pressure within at least a majority of the selected section of the formation above 2.0 bar absolute; and

producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons having an API gravity higher than an API gravity of condensable hydrocarbons in a mixture producible from the formation at the same temperature and at atmospheric pressure.

297. The method of claim 296, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

298. The method of claim 296, wherein controlling formation conditions comprises maintaining a temperature within the selected section within a pyrolysis temperature range.

299. The method of claim 296, wherein the one or more heat sources comprise electrical heaters.

300. The method of claim 296, wherein the one or more heat sources comprise surface burners.

301. The method of claim 296, wherein the one or more heat sources comprise flameless distributed combustors.

302. The method of claim 296, wherein the one or more heat sources comprise natural distributed combustors.

303. The method of claim 296, further comprising controlling the pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

304. The method of claim 296, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

305. The method of claim 296, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

306. The method of claim 296, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

307. The method of claim 296, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

308. The method of claim 296, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

309. The method of claim 296, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

310. The method of claim 296, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

311. The method of claim 296, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

312. The method of claim 296, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

313. The method of claim 296, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

314. The method of claim 296, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

315. The method of claim 296, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

316. The method of claim 296, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

317. The method of claim 296, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

318. The method of claim 296, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

319. The method of claim 296, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

320. The method of claim 296, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen,

wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

321. The method of claim 296, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

322. The method of claim 296, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

323. The method of claim 296, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

324. The method of claim 296, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

325. The method of claim 296, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

326. The method of claim 296, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

327. The method of claim 296, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

328. The method of claim 296, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

329. The method of claim 296, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

330. The method of claim 296, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

331. The method of claim 296, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

332. The method of claim 296, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

333. The method of claim 296, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

334. The method of claim 296, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

335. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

maintaining a pressure within at least a majority of the selected section of the formation to above 2.0 bar absolute; and

producing a fluid from the formation, wherein condensable hydrocarbons within the fluid comprise an atomic hydrogen to atomic carbon ratio of greater than about 1.75.

336. The method of claim 335, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

337. The method of claim 335, wherein controlling formation conditions comprises maintaining a temperature within the selected section within a pyrolysis temperature range.

338. The method of claim 335, wherein the one or more heat sources comprise electrical heaters.

339. The method of claim 335, wherein the one or more heat sources comprise surface burners.

340. The method of claim 335, wherein the one or more heat sources comprise flameless distributed combustors.

341. The method of claim 335, wherein the one or more heat sources comprise natural distributed combustors.

342. The method of claim 335, further comprising controlling the pressure and a temperature within at least a majority of the selected section of the formation, wherein

the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

343. The method of claim 335, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

344. The method of claim 335, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

345. The method of claim 335, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

346. The method of claim 335, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

347. The method of claim 335, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

348. The method of claim 335, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

349. The method of claim 335, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

350. The method of claim 335, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

351. The method of claim 335, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

352. The method of claim 335, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

353. The method of claim 335, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

354. The method of claim 335, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

355. The method of claim 335, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

356. The method of claim 335, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

357. The method of claim 335, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

358. The method of claim 335, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

359. The method of claim 335, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

360. The method of claim 335, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

361. The method of claim 335, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

362. The method of claim 335, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

363. The method of claim 335, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

364. The method of claim 335, further comprising altering the pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

365. The method of claim 335, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

366. The method of claim 335, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

367. The method of claim 335, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

368. The method of claim 335, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

369. The method of claim 335, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

370. The method of claim 335, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

371. The method of claim 335, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

372. The method of claim 335, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

373. The method of claim 335, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

374. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

maintaining a pressure within at least a majority of the selected section of the formation to above 2.0 bar absolute; and

producing a mixture from the formation, wherein the produced mixture comprises a higher amount of non-condensable components as compared to non-condensable components producible from the formation under the same temperature conditions and at atmospheric pressure.

375. The method of claim 374, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

376. The method of claim 374, wherein controlling formation conditions comprises maintaining a temperature within the selected section within a pyrolysis temperature range.

377. The method of claim 374, wherein the one or more heat sources comprise electrical heaters.

378. The method of claim 374, wherein the one or more heat sources comprise surface burners.

379. The method of claim 374, wherein the one or more heat sources comprise flameless distributed combustors.

380. The method of claim 374, wherein the one or more heat sources comprise natural distributed combustors.

381. The method of claim 374, further comprising controlling the pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

382. The method of claim 374, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

383. The method of claim 374, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than *Pwr*. wherein *Pwr* is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein *Pwr* is the heating energy/day, *h* is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

384. The method of claim 374, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

385. The method of claim 374, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

386. The method of claim 374, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

387. The method of claim 374, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

388. The method of claim 374, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

389. The method of claim 374, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

390. The method of claim 374, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

391. The method of claim 374, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

392. The method of claim 374, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

393. The method of claim 374, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

394. The method of claim 374, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

395. The method of claim 374, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

396. The method of claim 374, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

397. The method of claim 374, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

398. The method of claim 374, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

399. The method of claim 374, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

400. The method of claim 374, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

401. The method of claim 374, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

402. The method of claim 374, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

403. The method of claim 374, further comprising altering the pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

404. The method of claim 374, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

405. The method of claim 374, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

406. The method of claim 374, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

407. The method of claim 374, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

408. The method of claim 374, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

409. The method of claim 374, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

410. The method of claim 374, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

411. The method of claim 374, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

412. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation such that superimposed heat from the one or more heat sources pyrolyzes at least about 20 % by weight of hydrocarbons within the selected section of the formation; and

producing a mixture from the formation.

413. The method of claim 412, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

414. The method of claim 412, wherein controlling formation conditions comprises maintaining a temperature within the selected section within a pyrolysis temperature range.

415. The method of claim 412, wherein the one or more heat sources comprise electrical heaters.

416. The method of claim 412, wherein the one or more heat sources comprise surface burners.

417. The method of claim 412, wherein the one or more heat sources comprise flameless distributed combustors.

418. The method of claim 412, wherein the one or more heat sources comprise natural distributed combustors.

419. The method of claim 412, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein

the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

420. The method of claim 412, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

421. The method of claim 412, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

422. The method of claim 412, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

423. The method of claim 412, wherein providing heat from the one or more heat sources comprises heating the selected formation such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

424. The method of claim 412, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

425. The method of claim 412, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

426. The method of claim 412, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

427. The method of claim 412, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

428. The method of claim 412, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

429. The method of claim 412, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

430. The method of claim 412, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

431. The method of claim 412, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

432. The method of claim 412, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

433. The method of claim 412, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

434. The method of claim 412, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

435. The method of claim 412, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

436. The method of claim 412, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

437. The method of claim 412, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

438. The method of claim 412, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

439. The method of claim 412, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

440. The method of claim 412, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

441. The method of claim 412, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

442. The method of claim 412, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

443. The method of claim 412, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

444. The method of claim 412, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

445. The method of claim 412, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

446. The method of claim 412, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

447. The method of claim 412, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

448. The method of claim 412, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

449. The method of claim 412, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

450. The method of claim 412, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

451. The method of claim 412, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

452. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation such that superimposed heat from the one or more heat sources pyrolyzes at least about 20 % of hydrocarbons within the selected section of the formation; and

producing a mixture from the formation, wherein the mixture comprises a condensable component having an API gravity of at least about 25°.

453. The method of claim 452, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

454. The method of claim 452, wherein controlling formation conditions comprises maintaining a temperature within the selected section within a pyrolysis temperature range.

455. The method of claim 452, wherein the one or more heat sources comprise electrical heaters.

456. The method of claim 452, wherein the one or more heat sources comprise surface burners.

457. The method of claim 452, wherein the one or more heat sources comprise flameless distributed combustors.

458. The method of claim 452, wherein the one or more heat sources comprise natural distributed combustors.

459. The method of claim 452, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

460. The method of claim 452, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

461. The method of claim 452, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than *Pwr*. wherein *Pwr* is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein *Pwr* is the heating energy/day, *h* is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

462. The method of claim 452, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

463. The method of claim 452, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

464. The method of claim 452, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

465. The method of claim 452, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

466. The method of claim 452, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

467. The method of claim 452, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

468. The method of claim 452, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

469. The method of claim 452, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

470. The method of claim 452, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

471. The method of claim 452, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

472. The method of claim 452, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

473. The method of claim 452, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

474. The method of claim 452, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

475. The method of claim 452, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen,

wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

476. The method of claim 452, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

477. The method of claim 452, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

478. The method of claim 452, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

479. The method of claim 452, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

480. The method of claim 452, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

481. The method of claim 452, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

482. The method of claim 452, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

483. The method of claim 452, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

484. The method of claim 452, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

485. The method of claim 452, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

486. The method of claim 452, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

487. The method of claim 452, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

488. The method of claim 452, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

489. The method of claim 452, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

490. The method of claim 452, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

491. A method of treating a layer of a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the layer, wherein the one or more heat sources are positioned proximate an edge of the layer;

allowing the heat to transfer from the one or more heat sources to a selected section of the layer such that superimposed heat from the one or more heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation: and

producing a mixture from the formation.

492. The method of claim 491, wherein the one or more heat sources are laterally spaced from a center of the layer.

493. The method of claim 491, wherein the one or more heat sources are positioned in a staggered line.

494. The method of claim 491, wherein the one or more heat sources positioned proximate the edge of the layer can increase an amount of hydrocarbons produced per unit of energy input to the one or more heat sources.

495. The method of claim 491, wherein the one or more heat sources positioned proximate the edge of the layer can increase the volume of formation undergoing pyrolysis per unit of energy input to the one or more heat sources.

496. The method of claim 491, wherein the one or more heat sources comprise electrical heaters.

497. The method of claim 491, wherein the one or more heat sources comprise surface burners.

498. The method of claim 491, wherein the one or more heat sources comprise flameless distributed combustors.

499. The method of claim 491, wherein the one or more heat sources comprise natural distributed combustors.

500. The method of claim 491, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

501. The method of claim 491, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1.0 ° C per day during pyrolysis.

502. The method of claim 491, wherein providing heat from the one or more heat sources to at least the portion of the layer comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

503. The method of claim 491, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

504. The method of claim 491, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

505. The method of claim 491, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

506. The method of claim 491, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

507. The method of claim 491, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

508. The method of claim 491, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

509. The method of claim 491, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

510. The method of claim 491, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

511. The method of claim 491, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

512. The method of claim 491, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

513. The method of claim 491, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

514. The method of claim 491, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

515. The method of claim 491, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

516. The method of claim 491, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

517. The method of claim 491, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

518. The method of claim 491, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

519. The method of claim 491, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

520. The method of claim 519, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

521. The method of claim 491, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

522. The method of claim 491, further comprising controlling formation conditions, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

523. The method of claim 491, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

524. The method of claim 491, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

525. The method of claim 491, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

526. The method of claim 491, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

527. The method of claim 491, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

528. The method of claim 491, wherein producing the mixture comprises producing the mixture in a production well. and wherein at least about 7 heat sources are disposed in the formation for each production well.

529. The method of claim 491, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

530. The method of claim 491, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

531. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation; and

controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure; and

producing a mixture from the formation.

532. The method of claim 531, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

533. The method of claim 531, wherein controlling formation conditions comprises maintaining a temperature within the selected section within a pyrolysis temperature range.

534. The method of claim 531, wherein the one or more heat sources comprise electrical heaters.

535. The method of claim 531, wherein the one or more heat sources comprise surface burners.

536. The method of claim 531, wherein the one or more heat sources comprise flameless distributed combustors.

537. The method of claim 531, wherein the one or more heat sources comprise natural distributed combustors.

538. The method of claim 531, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

539. The method of claim 531, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (Cv), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein P_{wr} is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

540. The method of claim 531, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

541. The method of claim 531, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

542. The method of claim 531, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

543. The method of claim 531, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

544. The method of claim 531, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

545. The method of claim 531, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

546. The method of claim 531, wherein the produced mixture comprises condensable hydrocarbons. and wherein less than about 1 % by weight. when calculated on an atomic basis. of the condensable hydrocarbons is nitrogen.

547. The method of claim 531, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis. of the condensable hydrocarbons is oxygen.

548. The method of claim 531, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis. of the condensable hydrocarbons is sulfur.

549. The method of claim 531, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

550. The method of claim 531, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

551. The method of claim 531, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

552. The method of claim 531, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

553. The method of claim 531, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

554. The method of claim 531, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen,

wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

555. The method of claim 531, wherein the produced mixture comprises ammonia. and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

556. The method of claim 531, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

557. The method of claim 531, wherein the controlled pressure is at least about 2.0 bar absolute.

558. The method of claim 531, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

559. The method of claim 531, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

560. The method of claim 531, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

561. The method of claim 531, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

562. The method of claim 531, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

563. The method of claim 531, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

564. The method of claim 531, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

565. The method of claim 531, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

566. The method of claim 531, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

567. The method of claim 531, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

568. The method of claim 531, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

569. The method of claim 531, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

570. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation to raise an average temperature within the selected section to, or above, a temperature that will pyrolyze hydrocarbons within the selected section;

producing a mixture from the formation; and

controlling API gravity of the produced mixture to be greater than about 25 degrees API by controlling average pressure and average temperature in the selected section such that the average pressure in the selected section is greater than the pressure (p) set forth in the following equation for an assessed average temperature (T) in the selected section:

$$p = e^{[-44000/T + 67]}$$

where p is measured in psia and T is measured in ° Kelvin.

571. The method of claim 570, wherein the API gravity of the produced mixture is controlled to be greater than about 30 degrees API, and wherein the equation is:

$$p = e^{[-31000/T + 51]}.$$

572. The method of claim 570, wherein the API gravity of the produced mixture is controlled to be greater than about 35 degrees API, and wherein the equation is:

$$p = e^{[-22000/T + 38]}.$$

573. The method of claim 570, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

574. The method of claim 570, wherein controlling the average temperature comprises maintaining a temperature in the selected section within a pyrolysis temperature range.

575. The method of claim 570, wherein the one or more heat sources comprise electrical heaters.

576. The method of claim 570, wherein the one or more heat sources comprise surface burners.

577. The method of claim 570, wherein the one or more heat sources comprise flameless distributed combustors.

578. The method of claim 570, wherein the one or more heat sources comprise natural distributed combustors.

579. The method of claim 570, further comprising controlling a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

580. The method of claim 570, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

581. The method of claim 570, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

582. The method of claim 570, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

583. The method of claim 570, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

584. The method of claim 570, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

585. The method of claim 570, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

586. The method of claim 570, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

587. The method of claim 570, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

588. The method of claim 570, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

589. The method of claim 570, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

590. The method of claim 570, wherein the produced mixture comprises condensable hydrocarbons. wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

591. The method of claim 570, wherein the produced mixture comprises condensable hydrocarbons. and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

592. The method of claim 570, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

593. The method of claim 570, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

594. The method of claim 570, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

595. The method of claim 570, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

596. The method of claim 570, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

597. The method of claim 570, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

598. The method of claim 570, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

599. The method of claim 570, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

600. The method of claim 570, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

601. The method of claim 570, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

602. The method of claim 570, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

603. The method of claim 570, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

604. The method of claim 570, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

605. The method of claim 570, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

606. The method of claim 570, wherein the heat is controlled to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

607. The method of claim 570, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

608. The method of claim 570, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

609. The method of claim 570, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

610. A method of treating a coal formation in situ, comprising:

providing heat to at least a portion of a coal formation such that a temperature (T) in a substantial part of the heated portion exceeds 270 °C and hydrocarbons are pyrolyzed within the heated portion of the formation;

controlling a pressure (p) within at least a substantial part of the heated portion of the formation;

wherein $p_{bar} > e^{[(-A/T)+B-2.6744]}$;

wherein p is the pressure in bar absolute and T is the temperature in degrees K, and A and B are parameters that are larger than 10 and are selected in relation to the

characteristics and composition of the coal formation and on the required olefin content and carbon number of the pyrolyzed hydrocarbon fluids; and

producing pyrolyzed hydrocarbon fluids from the heated portion of the formation.

611. The method of claim 610, wherein A is greater than 14000 and B is greater than about 25 and a majority of the produced pyrolyzed hydrocarbon fluids have an average carbon number lower than 25 and comprise less than about 10 % by weight of olefins.

612. The method of claim 610, wherein T is less than about 390 °C, p is greater than about 1.4 bar, A is greater than about 44000, and b is greater than about 67, and a majority of the produced pyrolyzed hydrocarbon fluids have an average carbon number less than 25 and comprise less than 10 % by weight of olefins.

613. The method of claim 610, wherein T is less than about 390 °C, p is greater than about 2 bar, A is less than about 57000, and b is less than about 83, and a majority of the produced pyrolyzed hydrocarbon fluids have an average carbon number lower than about 21.

614. The method of claim 610, further comprising controlling the heat such that an average heating rate of the heated portion is less than about 3°C per day during pyrolysis.

615. The method of claim 610, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

616. The method of claim 610, wherein heat is transferred substantially by conduction from one or more heat sources located in one or more heat sources to the heated portion of the formation.

617. The method of claim 616, wherein the heat sources comprise heaters in which hydrocarbons are either injected into a heaters or released by the coal formation adjacent to a heater by an oxidant injected into the heater in or adjacent to which the combustion occurs and wherein at least part of the produced combustion gases are vented to surface via the heater in which the combustion occurs.

618. The method of claim 617, wherein heat is transferred substantially by conduction from one or more heat sources to the heated portion of the formation such that the thermal conductivity of at least part of the heated portion is substantially uniformly modified to a value greater than about 0.6 W/m °C and the permeability of said part increases substantially uniformly to a value greater than 1 Darcy.

619. The method of claim 610, further comprising controlling formation conditions to produce a mixture of hydrocarbon fluids and H_2, wherein a partial pressure of H_2 within the mixture flowing through the formation is greater than 0.5 Bar.

620. The method of claim 619, further comprising, hydrogenating a portion of the produced pyrolyzed hydrocarbon fluids with at least a portion of the produced hydrogen and heating the fluids with heat from hydrogenation .

621. The method of claim 610, wherein the coal formation is a coal seam and at least about 70% of the hydrocarbon content of the coal, when such hydrocarbon content is measured by a Fischer assay, is produced from the heated portion of the formation.

622. The method of claim 610, wherein the substantially gaseous pyrolyzed hydrocarbon fluids are produced from a production well, the method further comprising heating a wellbore of the production well to inhibit condensation of the hydrocarbon fluids within the wellbore.

623. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation to raise an average temperature within the selected section to, or above, a temperature that will pyrolyze hydrocarbons within the selected section;

producing a mixture from the formation; and

controlling a weight percentage of olefins of the produced mixture to be less than about 20 % by weight by controlling average pressure and average temperature in the selected section such that the average pressure in the selected section is greater than the pressure (p) set forth in the following equation for an assessed average temperature (T) in the selected section:

$$p = e^{[-57000/T + 83]}$$

where p is measured in psia and T is measured in ° Kelvin.

624. The method of claim 623, wherein the weight percentage of olefins of the produced mixture is controlled to be less than about 10 % by weight, and wherein the equation is:

$$p = e^{[-16000/T + 28]}.$$

625. The method of claim 623, wherein the weight percentage of olefins of the produced mixture is controlled to be less than about 5 % by weight, and wherein the equation is:

$$p = e^{[-12000/T - 22]}.$$

626. The method of claim 623, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

627. The method of claim 623, wherein the one or more heat sources comprise electrical heaters.

628. The method of claim 623, wherein the one or more heat sources comprise surface burners.

629. The method of claim 623, wherein the one or more heat sources comprise flameless distributed combustors.

630. The method of claim 623, wherein the one or more heat sources comprise natural distributed combustors.

631. The method of claim 623, further comprising controlling a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

632. The method of claim 631, wherein controlling an average temperature comprises maintaining a temperature within the selected section within a pyrolysis temperature range.

633. The method of claim 623, further comprising controlling the heat such that an average heating rate of the selected section is less than about 3.0 °C per day during pyrolysis.

634. The method of claim 623, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

635. The method of claim 623, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

636. The method of claim 623, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

637. The method of claim 623, wherein providing heat from the one or more heat sources comprises heating the selected formation such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

638. The method of claim 623, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

639. The method of claim 623, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

640. The method of claim 623, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

641. The method of claim 623, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

642. The method of claim 623, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

643. The method of claim 623, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

644. The method of claim 623, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

645. The method of claim 623, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

646. The method of claim 623, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

647. The method of claim 623, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

648. The method of claim 623, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

649. The method of claim 623, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

650. The method of claim 623, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

651. The method of claim 623, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

652. The method of claim 623, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

653. The method of claim 623, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

654. The method of claim 623, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

655. The method of claim 623, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

656. The method of claim 623, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

657. The method of claim 623, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

658. The method of claim 623, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

659. The method of claim 623, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

660. The method of claim 623, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

661. The method of claim 623, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

662. The method of claim 623, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

663. The method of claim 623, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

664. The method of claim 623, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

665. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation to raise an average temperature within the selected section to, or above, a temperature that will pyrolyze hydrocarbons within the selected section;

producing a mixture from the formation; and

controlling hydrocarbons having carbon numbers greater than 25 of the produced mixture to be less than about 25 % by weight by controlling average pressure and average temperature in the selected section such that the average pressure in the selected section is greater than the pressure (p) set forth in the following equation for an assessed average temperature (T) in the selected section:

$$p = e^{[-14000/T + 25]}$$

where p is measured in psia and T is measured in ° Kelvin.

666. The method of claim 665, wherein the hydrocarbons having carbon numbers greater than 25 of the produced mixture is controlled to be less than about 20 % by weight, and wherein the equation is:

$$p = e^{[-16000/T + 28]}.$$

667. The method of claim 665, wherein the hydrocarbons having carbon numbers greater than 25 of the produced mixture is controlled to be less than about 15 % by weight, and wherein the equation is:

$$p = e^{[-18000\,T + 32]}.$$

668. The method of claim 665, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

669. The method of claim 665, wherein the one or more heat sources comprise electrical heaters.

670. The method of claim 665, wherein the one or more heat sources comprise surface burners.

671. The method of claim 665, wherein the one or more heat sources comprise flameless distributed combustors.

672. The method of claim 665, wherein the one or more heat sources comprise natural distributed combustors.

673. The method of claim 665, further comprising controlling a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

674. The method of claim 673, wherein controlling the temperature comprises maintaining a temperature within the selected section within a pyrolysis temperature range.

675. The method of claim 665, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

676. The method of claim 665, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

677. The method of claim 665, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

678. The method of claim 665, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

679. The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

680. The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

681. The method of claim 665, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

682. The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

683. The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

684. The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

685. The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

686. The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

687. The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

688. The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

689. The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

690. The method of claim 665, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

691. The method of claim 665, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

692. The method of claim 665, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

693. The method of claim 665, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

694. The method of claim 665, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

695. The method of claim 665, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

696. The method of claim 665, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

697. The method of claim 665, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

698. The method of claim 665, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

699. The method of claim 665, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

700. The method of claim 665, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

701. The method of claim 665, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

702. The method of claim 665, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

703. The method of claim 665, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat

sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

704. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation to raise an average temperature within the selected section to, or above, a temperature that will pyrolyze hydrocarbons within the selected section;

producing a mixture from the formation; and

controlling an atomic hydrogen to carbon ratio of the produced mixture to be greater than about 1.7 by controlling average pressure and average temperature in the selected section such that the average pressure in the selected section is greater than the pressure (p) set forth in the following equation for an assessed average temperature (T) in the selected section:

$$p = e^{[-38000/T + 61]}$$

where p is measured in psia and T is measured in ° Kelvin.

705. The method of claim 704, wherein the atomic hydrogen to carbon ratio of the produced mixture is controlled to be greater than about 1.8, and wherein the equation is:

$$p = e^{[-13000/T + 24]}.$$

706. The method of claim 704, wherein the atomic hydrogen to carbon ratio of the produced mixture is controlled to be greater than about 1.9, and wherein the equation is:

$$p = e^{[-8000/T + 18]}.$$

707. The method of claim 704, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

708. The method of claim 704, wherein the one or more heat sources comprise electrical heaters.

709. The method of claim 704, wherein the one or more heat sources comprise surface burners.

710. The method of claim 704, wherein the one or more heat sources comprise flameless distributed combustors.

711. The method of claim 704, wherein the one or more heat sources comprise natural distributed combustors.

712. The method of claim 704, further comprising controlling a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

713. The method of claim 712, wherein controlling the temperature comprises maintaining a temperature within the selected section within a pyrolysis temperature range.

714. The method of claim 704, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

715. The method of claim 704, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than *Pwr*. wherein *Pwr* is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein *Pwr* is the heating energy/day, *h* is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

716. The method of claim 704, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

717. The method of claim 704, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

718. The method of claim 704, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

719. The method of claim 704, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

720. The method of claim 704, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

721. The method of claim 704, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

722. The method of claim 704, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

723. The method of claim 704, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

724. The method of claim 704, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

725. The method of claim 704, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

726. The method of claim 704, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

727. The method of claim 704, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

728. The method of claim 704, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

729. The method of claim 704, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

730. The method of claim 704, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen. wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

731. The method of claim 704, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

732. The method of claim 704, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

733. The method of claim 704, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

734. The method of claim 704, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

735. The method of claim 704, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

736. The method of claim 704, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

737. The method of claim 704, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

738. The method of claim 704, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

739. The method of claim 704, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

740. The method of claim 704, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

741. The method of claim 704, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

742. The method of claim 704, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

743. The method of claim 704, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

744. The method of claim 704, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat

sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

745. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least one portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

controlling a pressure-temperature relationship within at least the selected section of the formation by selected energy input into the one or more heat sources and by pressure release from the selected section through wellbores of the one or more heat sources; and

producing a mixture from the formation.

746. The method of claim 745, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

747. The method of claim 745, wherein the one or more heat sources comprise at least two heat sources.

748. The method of claim 745, wherein the one or more heat sources comprise surface burners.

749. The method of claim 745, wherein the one or more heat sources comprise flameless distributed combustors.

750. The method of claim 745, wherein the one or more heat sources comprise natural distributed combustors.

751. The method of claim 745, further comprising controlling the pressure-temperature relationship by controlling a rate of removal of fluid from the formation.

752. The method of claim 745, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

753. The method of claim 745, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

754. The method of claim 745, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

755. The method of claim 745, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

756. The method of claim 745, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

757. The method of claim 745, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

758. The method of claim 745, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

759. The method of claim 745, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

760. The method of claim 745, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

761. The method of claim 745, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

762. The method of claim 745, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis. of the condensable hydrocarbons is sulfur.

763. The method of claim 745, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

764. The method of claim 745, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

765. The method of claim 745, wherein the produced mixture comprises condensable hydrocarbons. and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

766. The method of claim 745, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

767. The method of claim 745, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

768. The method of claim 745, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

769. The method of claim 745, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

770. The method of claim 745, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

771. The method of claim 745, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

772. The method of claim 745, further comprising controlling formation conditions to produce a mixture of hydrocarbon fluids and H_2, wherein the partial pressure of H_2 within the mixture is greater than about 0.5 bar.

773. The method of claim 745, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

774. The method of claim 745, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

775. The method of claim 745, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

776. The method of claim 745, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

777. The method of claim 745, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

778. The method of claim 745, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

779. The method of claim 745, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

780. The method of claim 745, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

781. The method of claim 745, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

782. The method of claim 745, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

783. The method of claim 745, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

784. The method of claim 745, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

785. A method of treating a coal formation in situ, comprising:
heating a selected volume (V) of the coal formation, wherein formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

786. The method of claim 785, wherein heating a selected volume comprises heating with an electrical heater.

787. The method of claim 785, wherein heating a selected volume comprises heating with a surface burner.

788. The method of claim 785, wherein heating a selected volume comprises heating with a flameless distributed combustor.

789. The method of claim 785, wherein heating a selected volume comprises heating with a natural distributed combustors.

790. The method of claim 785, further comprising controlling a pressure and a temperature within at least a majority of the selected volume of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

791. The method of claim 785, further comprising controlling the heating such that an average heating rate of the selected volume is less than about 1 °C per day during pyrolysis.

792. The method of claim 785, wherein a value for C_v is determined as an average heat capacity of two or more samples taken from the coal formation.

793. The method of claim 785, wherein heating the selected volume comprises transferring heat substantially by conduction.

794. The method of claim 785, wherein heating the selected volume comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

795. The method of claim 785, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

796. The method of claim 785, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

797. The method of claim 785, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

798. The method of claim 785, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

799. The method of claim 785, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

800. The method of claim 785, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

801. The method of claim 785, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

802. The method of claim 785, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable

hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

803. The method of claim 785, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

804. The method of claim 785, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

805. The method of claim 785, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

806. The method of claim 785, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

807. The method of claim 785, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

808. The method of claim 785, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

809. The method of claim 785, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer

810. The method of claim 785, further comprising controlling a pressure within at least a majority of the selected volume of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

811. The method of claim 785, further comprising controlling formation conditions to produce a mixture from the formation comprising condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

812. The method of claim 785, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

813. The method of claim 785, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

814. The method of claim 785, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

815. The method of claim 785, further comprising:

providing hydrogen (H_2) to the heated volume to hydrogenate hydrocarbons within the volume; and

heating a portion of the volume with heat from hydrogenation.

816. The method of claim 785, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

817. The method of claim 785, further comprising increasing a permeability of a majority of the selected volume to greater than about 100 millidarcy.

818. The method of claim 785, further comprising substantially uniformly increasing a permeability of a majority of the selected volume.

819. The method of claim 785, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

820. The method of claim 785, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

821. The method of claim 785, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

822. The method of claim 785, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

823. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation to raise an average temperature within the selected section to, or above, a temperature that will pyrolyze hydrocarbons within the selected section;

controlling heat output from the one or more heat sources such that an average heating rate of the selected section rises by less than about 3 °C per day when the average temperature of the selected section is at, or above, the temperature that will pyrolyze hydrocarbons within the selected section; and

producing a mixture from the formation.

824. The method of claim 823, controlling heat output comprises:

raising the average temperature within the selected section to a first temperature that is at or above a minimum pyrolysis temperature of hydrocarbons within the formation;

limiting energy input into the one or more heat sources to inhibit increase in temperature of the selected section; and

increasing energy input into the formation to raise an average temperature of the selected section above the first temperature when production of formation fluid declines below a desired production rate.

825. The method of claim 823, controlling heat output comprises:

raising the average temperature within the selected section to a first temperature that is at or above a minimum pyrolysis temperature of hydrocarbons within the formation;

limiting energy input into the one or more heat sources to inhibit increase in temperature of the selected section; and

increasing energy input into the formation to raise an average temperature of the selected section above the first temperature when quality of formation fluid produced from the formation falls below a desired quality.

826. The method of claim 823, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section.

827. The method of claim 823, wherein the one or more heat sources comprise electrical heaters.

828. The method of claim 823, wherein the one or more heat sources comprise surface burners.

829. The method of claim 823, wherein the one or more heat sources comprise flameless distributed combustors.

830. The method of claim 823, wherein the one or more heat sources comprise natural distributed combustors.

831. The method of claim 823, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

832. The method of claim 823, wherein the heat is controlled that an average heating rate of the selected section is less than about 1.5 °C per day during pyrolysis.

833. The method of claim 823, wherein the heat is controlled that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

834. The method of claim 823, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density.

835. The method of claim 823, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

836. The method of claim 823, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

837. The method of claim 823, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

838. The method of claim 823, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

839. The method of claim 823, wherein the produced mixture comprises condensable hydrocarbons, wherein the condensable hydrocarbons have an olefin content is less than about 2.5 % by weight of the condensable hydrocarbons, and wherein the olefin content is greater than about 0.1 % by weight of the condensable hydrocarbons.

840. The method of claim 823, wherein the produced mixture comprises non-condensable hydrocarbons, wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons is less than about 0.15, and wherein the ratio of ethene to ethane is greater than about 0.001.

841. The method of claim 823, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons is less than about 0.10 and wherein the ratio of ethene to ethane is greater than about 0.001.

842. The method of claim 823, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons is less than about 0.05 and wherein the ratio of ethene to ethane is greater than about 0.001.

843. The method of claim 823, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

844. The method of claim 823, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

845. The method of claim 823, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

846. The method of claim 823, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

847. The method of claim 823, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

848. The method of claim 823, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

849. The method of claim 823, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

850. The method of claim 823, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

851. The method of claim 823, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

852. The method of claim 823, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

853. The method of claim 823, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

854. The method of claim 823, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

855. The method of claim 823, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

856. The method of claim 823, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

857. The method of claim 823, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

858. The method of claim 823, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

859. The method of claim 823, further comprising:

providing H_2 to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

860. The method of claim 823, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

861. The method of claim 823, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

862. The method of claim 823, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

863. The method of claim 823, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

864. The method of claim 823, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

865. The method of claim 823, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

866. The method of claim 823, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

867. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation; to heat a selected section of the formation to an average temperature above about 270 °C;

allowing the heat to transfer from the one or more heat sources to the selected section of the formation;

controlling the heat from the one or more heat sources such that an average heating rate of the selected section is less than about 3 °C per day during pyrolysis; and

producing a mixture from the formation.

868. The method of claim 867, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

869. The method of claim 867, wherein the one or more heat sources comprise electrical heaters.

870. The method of claim 867, further comprising supplying electricity to the electrical heaters substantially during non-peak hours.

871. The method of claim 867, wherein the one or more heat sources comprise surface burners.

872. The method of claim 867, wherein the one or more heat sources comprise flameless distributed combustors.

873. The method of claim 867, wherein the one or more heat sources comprise natural distributed combustors.

874. The method of claim 867, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

875. The method of claim 867, wherein the heat is further controlled such that an average heating rate of the selected section is less than about 3 °C/day until production of condensable hydrocarbons substantially ceases.

876. The method of claim 867, wherein the heat is further controlled that an average heating rate of the selected section is less than about 1.5 °C per day during pyrolysis.

877. The method of claim 867, wherein the heat is further controlled such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

878. The method of claim 867, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density.

879. The method of claim 867, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

880. The method of claim 867, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

881. The method of claim 867, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

882. The method of claim 867, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

883. The method of claim 867, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

884. The method of claim 867, wherein the produced mixture comprises non-condensable hydrocarbons, wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons is less than about 0.15, and wherein the ratio of ethene to ethane is greater than about 0.001.

885. The method of claim 867, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

886. The method of claim 867, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

887. The method of claim 867, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

888. The method of claim 867, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

889. The method of claim 867, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

890. The method of claim 867, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

891. The method of claim 867, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

892. The method of claim 867, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

893. The method of claim 867, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

894. The method of claim 867, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

895. The method of claim 867, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

896. The method of claim 867, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

897. The method of claim 867, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

898. The method of claim 897, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

899. The method of claim 867, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

900. The method of claim 867, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

901. The method of claim 867, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

902. The method of claim 867, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

903. The method of claim 867, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

904. The method of claim 867, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

905. The method of claim 867, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

906. The method of claim 867, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

907. The method of claim 867, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

908. The method of claim 867, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

909. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

producing a mixture from the formation through at least one production well;

monitoring a temperature at or in the production well; and

controlling heat input to raise the monitored temperature at a rate of less than about 3 °C per day.

910. The method of claim 909, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

911. The method of claim 909, wherein the one or more heat sources comprise electrical heaters.

912. The method of claim 909, wherein the one or more heat sources comprise surface burners.

913. The method of claim 909, wherein the one or more heat sources comprise flameless distributed combustors.

914. The method of claim 909, wherein the one or more heat sources comprise natural distributed combustors.

915. The method of claim 909, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

916. The method of claim 909, wherein the heat is controlled that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

917. The method of claim 909, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density.

918. The method of claim 909, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

919. The method of claim 909, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

920. The method of claim 909, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

921. The method of claim 909, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

922. The method of claim 909, wherein the produced mixture comprises non-condensable hydrocarbons, wherein a molar ratio of ethene to ethane in the non-

condensable hydrocarbons is less than about 0.15, and wherein the ratio of ethene to ethane is greater than about 0.001.

923. The method of claim 909, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

924. The method of claim 909, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

925. The method of claim 909, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

926. The method of claim 909, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

927. The method of claim 909, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

928. The method of claim 909, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

929. The method of claim 909, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

930. The method of claim 909, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

931. The method of claim 909, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

932. The method of claim 909, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

933. The method of claim 909, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

934. The method of claim 909, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

935. The method of claim 909, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

936. The method of claim 935, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

937. The method of claim 909, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

938. The method of claim 909, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

939. The method of claim 909, further comprising:

providing H_2 to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

940. The method of claim 909, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

941. The method of claim 909, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

942. The method of claim 909, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

943. The method of claim 909, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

944. The method of claim 909, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

945. The method of claim 909, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

946. The method of claim 909, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

947. A method of treating a coal formation in situ, comprising:

heating a portion of the formation to a temperature sufficient to support oxidation of hydrocarbons within the portion, wherein the portion is located substantially adjacent to a wellbore;

flowing an oxidant through a conduit positioned within the wellbore to a heat source zone within the portion, wherein the heat source zone supports an oxidation reaction between hydrocarbons and the oxidant;

reacting a portion of the oxidant with hydrocarbons to generate heat; and

transferring generated heat substantially by conduction to a pyrolysis zone of the formation to pyrolyze at least a portion of the hydrocarbons within the pyrolysis zone.

948. The method of claim 947, wherein heating the portion of the formation comprises raising a temperature of the portion above about 400 °C.

949. The method of claim 947, wherein the conduit comprises critical flow orifices, the method further comprising flowing the oxidant through the critical flow orifices to the heat source zone.

950. The method of claim 947, further comprising removing reaction products from the heat source zone through the wellbore.

951. The method of claim 947, further comprising removing excess oxidant from the heat source zone to inhibit transport of the oxidant to the pyrolysis zone.

952. The method of claim 947, further comprising transporting the oxidant from the conduit to the heat source zone substantially by diffusion.

953. The method of claim 947, further comprising heating the conduit with reaction products being removed through the wellbore.

954. The method of claim 947, wherein the oxidant comprises hydrogen peroxide.

955. The method of claim 947, wherein the oxidant comprises air.

956. The method of claim 947, wherein the oxidant comprises a fluid substantially free of nitrogen.

957. The method of claim 947, further comprising limiting an amount of oxidant to maintain a temperature of the heat source zone less than about 1200 °C.

958. The method of claim 947, wherein heating the portion of the formation comprises electrically heating the formation.

959. The method of claim 947, wherein heating the portion of the formation comprises heating the portion using exhaust gases from a surface burner.

960. The method of claim 947, wherein heating the portion of the formation comprises heating the portion with a flameless distributed combustor.

961. The method of claim 947, further comprising controlling a pressure and a temperature within at least a majority of the pyrolysis zone, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

962. The method of claim947, further comprising controlling the heat such that an average heating rate of the pyrolysis zone is less than about 1 °C per day during pyrolysis.

963. The method of claim 947, wherein heating the portion comprises heating the pyrolysis zone such that a thermal conductivity of at least a portion of the pyrolysis zone is greater than about 0.5 W/(m °C).

964. The method of claim 947, further comprising controlling a pressure within at least a majority of the pyrolysis zone of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

965. The method of claim 947, further comprising:

providing hydrogen (H_2) to the pyrolysis zone to hydrogenate hydrocarbons within the pyrolysis zone; and

heating a portion of the pyrolysis zone with heat from hydrogenation.

966. The method of claim 947, wherein transferring generated heat comprises increasing a permeability of a majority of the pyrolysis zone to greater than about 100 millidarcy.

967. The method of claim 947, wherein transferring generated heat comprises substantially uniformly increasing a permeability of a majority of the pyrolysis zone.

968. The method of claim 947, wherein the heating is controlled to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

969. The method of claim 947, wherein the wellbore is located along strike to reduce pressure differentials along a heated length of the wellbore.

970. The method of claim 947, wherein the wellbore is located along strike to increase uniformity of heating along a heated length of the wellbore.

971. The method of claim 947, wherein the wellbore is located along strike to increase control of heating along a heated length of the wellbore.

972. A method of treating a coal formation in situ, comprising:

heating a portion of the formation to a temperature sufficient to support reaction of hydrocarbons within the portion of the formation with an oxidant;

flowing the oxidant into a conduit, and wherein the conduit is connected such that the oxidant can flow from the conduit to the hydrocarbons;

allowing the oxidant and the hydrocarbons to react to produce heat in a heat source zone;

allowing heat to transfer from the heat source zone to a pyrolysis zone in the formation to pyrolyze at least a portion of the hydrocarbons within the pyrolysis zone; and

removing reaction products such that the reaction products are inhibited from flowing from the heat source zone to the pyrolysis zone.

973. The method of claim 972, wherein heating the portion of the formation comprises raising the temperature of the portion above about 400 °C.

974. The method of claim 972, wherein heating the portion of the formation comprises electrically heating the formation.

975. The method of claim 972, wherein heating the portion of the formation comprises heating the portion using exhaust gases from a surface burner.

976. The method of claim 972, wherein the conduit comprises critical flow orifices, the method further comprising flowing the oxidant through the critical flow orifices to the heat source zone.

977. The method of claim 972, wherein the conduit is located within a wellbore. wherein removing reaction products comprises removing reaction products from the heat source zone through the wellbore.

978. The method of claim 972, further comprising removing excess oxidant from the heat source zone to inhibit transport of the oxidant to the pyrolysis zone.

979. The method of claim 972, further comprising transporting the oxidant from the conduit to the heat source zone substantially by diffusion.

980. The method of claim 972, wherein the conduit is located within a wellbore, the method further comprising heating the conduit with reaction products being removed through the wellbore to raise a temperature of the oxidant passing through the conduit.

981. The method of claim 972, wherein the oxidant comprises hydrogen peroxide.

982. The method of claim 972, wherein the oxidant comprises air.

983. The method of claim 972, wherein the oxidant comprises a fluid substantially free of nitrogen.

984. The method of claim 972, further comprising limiting an amount of oxidant to maintain a temperature of the heat source zone less than about 1200 °C.

985. The method of claim 972, further comprising limiting an amount of oxidant to maintain a temperature of the heat source zone at a temperature that inhibits production of oxides of nitrogen.

986. The method of claim 972, wherein heating a portion of the formation to a temperature sufficient to support oxidation of hydrocarbons within the portion further comprises heating with a flameless distributed combustor.

987. The method of claim 972, further comprising controlling a pressure and a temperature within at least a majority of the pyrolysis zone of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

988. The method of claim 972, further comprising controlling the heat such that an average heating rate of the pyrolysis zone is less than about 1 °C per day during pyrolysis.

989. The method of claim 972, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

990. The method of claim 972, wherein allowing heat to transfer comprises heating the pyrolysis zone such that a thermal conductivity of at least a portion of the pyrolysis zone is greater than about 0.5 W/(m °C).

991. The method of claim 972, further comprising controlling a pressure within at least a majority of the pyrolysis zone, wherein the controlled pressure is at least about 2.0 bar absolute.

992. The method of claim 972, further comprising:

providing hydrogen (H_2) to the pyrolysis zone to hydrogenate hydrocarbons within the pyrolysis zone; and

heating a portion of the pyrolysis zone with heat from hydrogenation.

993. The method of claim 972, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the pyrolysis zone to greater than about 100 millidarcy.

994. The method of claim 972, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the pyrolysis zone.

995. The method of claim 972, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

996. An in situ method for heating a coal formation, comprising:

heating a portion of the formation to a temperature sufficient to support reaction of hydrocarbons within the portion of the formation with an oxidizing fluid, wherein the portion is located substantially adjacent to an opening in the formation;

providing the oxidizing fluid to a heat source zone in the formation;

allowing the oxidizing gas to react with at least a portion of the hydrocarbons at the heat source zone to generate heat in the heat source zone; and

transferring the generated heat substantially by conduction from the heat source zone to a pyrolysis zone in the formation.

997. The method of claim 996, further comprising transporting the oxidizing fluid through the heat source zone by diffusion.

998. The method of claim 996, further comprising directing at least a portion of the oxidizing fluid into the opening through orifices of a conduit disposed in the opening.

999. The method of claim 996, further comprising controlling a flow of the oxidizing fluid with critical flow orifices of a conduit disposed in the opening such that a rate of oxidation is controlled.

1000. The method of claim 996, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit.

1001. The method of claim 996, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through

the conduit and transferring substantial heat from the oxidation product in the conduit to the oxidizing fluid in the conduit.

1002. The method of claim 996, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit, wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

1003. The method of claim 996, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit and controlling a pressure between the oxidizing fluid and the oxidation product in the conduit to reduce contamination of the oxidation product by the oxidizing fluid.

1004. The method of claim 996, wherein a center conduit is disposed within an outer conduit, and wherein the outer conduit is disposed within the opening, the method further comprising providing the oxidizing fluid into the opening through the center conduit and removing an oxidation product through the outer conduit.

1005. The method of claim 996, wherein the heat source zone extends radially from the opening a width of less than approximately 0.15 m.

1006. The method of claim 996, wherein heating the portion comprises applying electrical current to an electric heater disposed within the opening.

1007. The method of claim 996, wherein the pyrolysis zone is substantially adjacent to the heat source zone.

1008. The method of claim 996, further comprising controlling a pressure and a temperature within at least a majority of the pyrolysis zone of the formation. wherein the

pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1009. The method of claim 996, further comprising controlling the heat such that an average heating rate of the pyrolysis zone is less than about 1 °C per day during pyrolysis.

1010. The method of claim 996, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1011. The method of claim 996, wherein allowing heat to transfer comprises heating the portion such that a thermal conductivity of at least a portion of the pyrolysis zone is greater than about 0.5 W/(m °C).

1012. The method of claim 996, further comprising controlling a pressure within at least a majority of the pyrolysis zone, wherein the controlled pressure is at least about 2.0 bar absolute.

1013. The method of claim 996, further comprising:

providing hydrogen (H_2) to the pyrolysis zone to hydrogenate hydrocarbons within the pyrolysis zone; and

heating a portion of the pyrolysis zone with heat from hydrogenation.

1014. The method of claim 996, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the pyrolysis zone to greater than about 100 millidarcy.

1015. The method of claim 996, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the pyrolysis zone.

1016. The method of claim 996, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1017. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

producing a mixture from the formation; and

maintaining an average temperature within the selected section above a minimum pyrolysis temperature and below a vaporization temperature of hydrocarbons having carbon numbers greater than 25 to inhibit production of a substantial amount of hydrocarbons having carbon numbers greater than 25 in the mixture.

1018. The method of claim 1017, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1019. The method of claim 1017, wherein maintaining the average temperature within the selected section comprises maintaining the temperature within a pyrolysis temperature range.

1020. The method of claim 1017, wherein the one or more heat sources comprise electrical heaters.

1021. The method of claim 1017, wherein the one or more heat sources comprise surface burners.

1022. The method of claim 1017, wherein the one or more heat sources comprise flameless distributed combustors.

1023. The method of claim 1017, wherein the one or more heat sources comprise natural distributed combustors.

1024. The method of claim 1017, wherein the minimum pyrolysis temperature is greater than about 270 °C.

1025. The method of claim 1017, wherein the vaporization temperature is less than approximately 450 °C at atmospheric pressure.

1026. The method of claim 1017, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1027. The method of claim 1017, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1028. The method of claim 1017, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1029. The method of claim 1017, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1030. The method of claim 1017, wherein providing heat from the one or more heat sources comprises heating the selected formation such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1031. The method of claim 1017, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1032. The method of claim 1017, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1033. The method of claim 1017, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

1034. The method of claim 1017, wherein the produced mixture comprises non-condensable hydrocarbons, wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons is less than about 0.15, and wherein the ratio of ethene to ethane is greater than about 0.001.

1035. The method of claim 1017, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1036. The method of claim 1017, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1037. The method of claim 1017, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1038. The method of claim 1017, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1039. The method of claim 1017, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1040. The method of claim 1017, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1041. The method of claim 1017, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1042. The method of claim 1017, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1043. The method of claim 1017, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1044. The method of claim 1017, wherein the produced mixture comprises ammonia. and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1045. The method of claim 1017, wherein the produced mixture comprises ammonia. and wherein the ammonia is used to produce fertilizer.

1046. The method of claim 1017, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1047. The method of claim 1017, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1048. The method of claim 1047, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

1049. The method of claim 1017, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

1050. The method of claim 1017, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1051. The method of claim 1017, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1052. The method of claim 1017, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1053. The method of claim 1017, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1054. The method of claim 1017, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1055. The method of claim 1017, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1056. The method of claim 1017, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1057. The method of claim 1017, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1058. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

controlling a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than 25; and

producing a mixture from the formation.

1059. The method of claim 1058, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1060. The method of claim 1058, wherein the one or more heat sources comprise electrical heaters.

1061. The method of claim 1058, wherein the one or more heat sources comprise surface burners.

1062. The method of claim 1058, wherein the one or more heat sources comprise flameless distributed combustors.

1063. The method of claim 1058, wherein the one or more heat sources comprise natural distributed combustors.

1064. The method of claim 1058, further comprising controlling a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1065. The method of claim 1064, wherein controlling the temperature comprises maintaining a temperature within the selected section within a pyrolysis temperature range.

1066. The method of claim 1058, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1067. The method of claim 1058, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1068. The method of claim 1058, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1069. The method of claim 1058, wherein providing heat from the one or more heat sources comprises heating the selected formation such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1070. The method of claim 1058, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1071. The method of claim 1058, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1072. The method of claim 1058, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

1073. The method of claim 1058, wherein the produced mixture comprises non-condensable hydrocarbons, wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons is less than about 0.15, and wherein the ratio of ethene to ethane is greater than about 0.001.

1074. The method of claim 1058, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1075. The method of claim 1058, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1076. The method of claim 1058, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1077. The method of claim 1058, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1078. The method of claim 1058, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1079. The method of claim 1058, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1080. The method of claim 1058, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1081. The method of claim 1058, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1082. The method of claim 1058, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1083. The method of claim 1058, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1084. The method of claim 1058, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1085. The method of claim 1058, further comprising controlling the pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1086. The method of claim 1058, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1087. The method of claim 1086, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

1088. The method of claim 1058, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

1089. The method of claim 1058, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1090. The method of claim 1058, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1091. The method of claim 1058, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1092. The method of claim 1058, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1093. The method of claim 1058, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1094. The method of claim 1058, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1095. The method of claim 1058, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1096. The method of claim 1058, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1097. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation; and

producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1098. The method of claim 1097, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1099. The method of claim 1097, wherein the one or more heat sources comprise electrical heaters.

1100. The method of claim 1097, wherein the one or more heat sources comprise surface burners.

1101. The method of claim 1097, wherein the one or more heat sources comprise flameless distributed combustors.

1102. The method of claim 1097, wherein the one or more heat sources comprise natural distributed combustors.

1103. The method of claim 1097, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1104. The method of claim 1097, wherein controlling the temperature comprises maintaining the temperature within the selected section within a pyrolysis temperature range.

1105. The method of claim 1097, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1106. The method of claim 1097, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation: and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1107. The method of claim 1097, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1108. The method of claim 1097, wherein providing heat from the one or more heat sources comprises heating the selected formation such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1109. The method of claim 1097, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1110. The method of claim 1097, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1111. The method of claim 1097, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

1112. The method of claim 1097, wherein the produced mixture comprises non-condensable hydrocarbons, wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons is less than about 0.15, and wherein the ratio of ethene to ethane is greater than about 0.001.

1113. The method of claim 1097, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1114. The method of claim 1097, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1115. The method of claim 1097, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1116. The method of claim 1097, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1117. The method of claim 1097, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1118. The method of claim 1097, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1119. The method of claim 1097, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1120. The method of claim 1097, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1121. The method of claim 1097, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1122. The method of claim 1097, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1123. The method of claim 1097, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1124. The method of claim 1097, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1125. The method of claim 1097, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1126. The method of claim 1125, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

1127. The method of claim 1097, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1128. The method of claim 1097, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

1129. The method of claim 1097, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1130. The method of claim 1097, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1131. The method of claim 1097, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1132. The method of claim 1097, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1133. The method of claim 1097, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1134. The method of claim 1097, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1135. The method of claim 1097, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1136. The method of claim 1097, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1137. A method of treating a coal formation in situ, comprising:

heating a section of the formation to a pyrolysis temperature from at least a first heat source, a second heat source and a third heat source, and wherein the first heat source, the second heat source and the third heat source are located along a perimeter of the section;

controlling heat input to the first heat source, the second heat source and the third heat source to limit a heating rate of the section to a rate configured to produce a mixture from the formation with an olefin content of less than about 15% by weight of condensable fluids (on a dry basis) within the produced mixture; and

producing the mixture from the formation through a production well.

1138. The method of claim 1137, wherein superposition of heat form the first heat source, second heat source, and third heat source pyrolyzes a portion of the hydrocarbons within the formation to fluids

1139. The method of claim 1137, wherein the pyrolysis temperature is between about 270 °C and about 400 °C.

1140. The method of claim 1137, wherein the first heat source is operated for less than about twenty four hours a day.

1141. The method of claim 1137, wherein the first heat source comprises an electrical heater.

1142. The method of claim 1137, wherein the first heat source comprises a surface burner.

1143. The method of claim 1137, wherein the first heat source comprises a flameless distributed combustor.

1144. The method of claim 1137, wherein the first heat source, second heat source and third heat source are positioned substantially at apexes of an equilateral triangle.

1145. The method of claim 1137, wherein the production well is located substantially at a geometrical center of the first heat source, second heat source, and third heat source.

1146. The method of claim 1137, further comprising a fourth heat source, fifth heat source, and sixth heat source located along the perimeter of the section.

1147. The method of claim 1146, wherein the heat sources are located substantially at apexes of a regular hexagon.

1148. The method of claim 1147, wherein the production well is located substantially at a center of the hexagon.

1149. The method of claim 1137, further comprising controlling a pressure and a temperature within at least a majority of the section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1150. The method of claim 1137, wherein controlling the temperature comprises maintaining the temperature within the selected section within a pyrolysis temperature range.

1151. The method of claim 1137, further comprising controlling the heat such that an average heating rate of the section is less than about 3 °C per day during pyrolysis.

1152. The method of claim 1137, further comprising controlling the heat such that an average heating rate of the section is less than about 1 °C per day during pyrolysis.

1153. The method of claim 1137, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation: and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1154. The method of claim 1137, wherein heating the section of the formation comprises transferring heat substantially by conduction.

1155. The method of claim 1137, wherein providing heat from the one or more heat sources comprises heating the section such that a thermal conductivity of at least a portion of the section is greater than about 0.5 W/(m °C).

1156. The method of claim 1137, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1157. The method of claim 1137, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1158. The method of claim 1137, wherein the produced mixture comprises non-condensable hydrocarbons, wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons is less than about 0.15, and wherein the ratio of ethene to ethane is greater than about 0.001.

1159. The method of claim 1137, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1160. The method of claim 1137, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1161. The method of claim 1137, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1162. The method of claim 1137, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1163. The method of claim 1137, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1164. The method of claim 1137, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1165. The method of claim 1137, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1166. The method of claim 1137, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1167. The method of claim 1137, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen. wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1168. The method of claim 1137, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1169. The method of claim 1137, wherein the produced mixture comprises ammonia. and wherein the ammonia is used to produce fertilizer.

1170. The method of claim 1137, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1171. The method of claim 1137, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1172. The method of claim 1171, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

1173. The method of claim 1137, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1174. The method of claim 1137, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

1175. The method of claim 1137, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1176. The method of claim 1137, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1177. The method of claim 1137, heating the section comprises increasing a permeability of a majority of the section to greater than about 100 millidarcy.

1178. The method of claim 1137, wherein heating the section comprises substantially uniformly increasing a permeability of a majority of the section.

1179. The method of claim 1137, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1180. The method of claim 1137, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1181. The method of claim 1137, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1182. The method of claim 1137, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1183. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation; and

producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1184. The method of claim 1183, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1185. The method of claim 1183, wherein the one or more heat sources comprise electrical heaters.

1186. The method of claim 1183, wherein the one or more heat sources comprise surface burners.

1187. The method of claim 1183, wherein the one or more heat sources comprise flameless distributed combustors.

1188. The method of claim 1183, wherein the one or more heat sources comprise natural distributed combustors.

1189. The method of claim 1183, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1190. The method of claim 1189, wherein controlling the temperature comprises maintaining the temperature within the selected section within a pyrolysis temperature range.

1191. The method of claim 1183, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1192. The method of claim 1183, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1193. The method of claim 1183, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1194. The method of claim 1183, wherein providing heat from the one or more heat sources comprises heating the selected formation such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1195. The method of claim 1183, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1196. The method of claim 1183, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1197. The method of claim 1183, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

1198. The method of claim 1183, wherein the produced mixture comprises non-condensable hydrocarbons, wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons is less than about 0.15, and wherein the ratio of ethene to ethane is greater than about 0.001.

1199. The method of claim 1183, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1200. The method of claim 1183, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1201. The method of claim 1183, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable

hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1202. The method of claim 1183, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1203. The method of claim 1183, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1204. The method of claim 1183, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1205. The method of claim 1183, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1206. The method of claim 1183, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1207. The method of claim 1183, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1208. The method of claim 1183, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1209. The method of claim 1183, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1210. The method of claim 1183, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1211. The method of claim 1211, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

1212. The method of claim 1183, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1213. The method of claim 1183, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

1214. The method of claim 1183, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1215. The method of claim 1183, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1216. The method of claim 1183, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1217. The method of claim 1183, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1218. The method of claim 1183, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1219. The method of claim 1183, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1220. The method of claim 1183, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1221. The method of claim 1183, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1222. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation; and

producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1223. The method of claim 1222, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1224. The method of claim 1222, wherein the one or more heat sources comprise electrical heaters.

1225. The method of claim 1222, wherein the one or more heat sources comprise surface burners.

1226. The method of claim 1222, wherein the one or more heat sources comprise flameless distributed combustors.

1227. The method of claim 1222, wherein the one or more heat sources comprise natural distributed combustors.

1228. The method of claim 1222, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1229. The method of claim 1228, wherein controlling the temperature comprises maintaining the temperature within the selected section within a pyrolysis temperature range.

1230. The method of claim 1222, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1231. The method of claim 1222, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1232. The method of claim 1222, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1233. The method of claim 1222, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1234. The method of claim 1222, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1235. The method of claim 1222, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1236. The method of claim 1222, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

1237. The method of claim 1222, wherein the produced mixture comprises non-condensable hydrocarbons, wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons is less than about 0.15, and wherein the ratio of ethene to ethane is greater than about 0.001.

1238. The method of claim 1222, wherein the produced mixture comprises condensable hydrocarbons. and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1239. The method of claim 1222, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis. of the condensable hydrocarbons is oxygen.

1240. The method of claim 1222, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis. of the condensable hydrocarbons is sulfur.

1241. The method of claim 1222, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds. and wherein the oxygen containing compounds comprise phenols.

1242. The method of claim 1222, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1243. The method of claim 1222, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1244. The method of claim 1222, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1245. The method of claim 1222, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1246. The method of claim 1222, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1247. The method of claim 1222, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1248. The method of claim 1222, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1249. The method of claim 1222, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1250. The method of claim 1222, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1251. The method of claim 1250, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

1252. The method of claim 1222, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1253. The method of claim 1222, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

1254. The method of claim 1222, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1255. The method of claim 1222, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1256. The method of claim 1222, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1257. The method of claim 1222, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1258. The method of claim 1222, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1259. The method of claim 1222, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1260. The method of claim 1222, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1261. The method of claim 1222, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1262. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation; and

producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1263. The method of claim 1262, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1264. The method of claim 1262, wherein the one or more heat sources comprise electrical heaters.

1265. The method of claim 1262, wherein the one or more heat sources comprise surface burners.

1266. The method of claim 1262, wherein the one or more heat sources comprise flameless distributed combustors.

1267. The method of claim 1262, wherein the one or more heat sources comprise natural distributed combustors.

1268. The method of claim 1262, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1269. The method of claim 1268, wherein controlling the temperature comprises maintaining the temperature within the selected section within a pyrolysis temperature range.

1270. The method of claim 1262, further comprising controlling the heat into such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1271. The method of claim 1262, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation: and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1272. The method of claim 1262, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1273. The method of claim 1262, wherein providing heat from the one or more heat sources comprises heating the selected formation such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1274. The method of claim 1262, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1275. The method of claim 1262, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1276. The method of claim 1262, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

1277. The method of claim 1262, wherein the produced mixture comprises non-condensable hydrocarbons, wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons is less than about 0.15, and wherein the ratio of ethene to ethane is greater than about 0.001.

1278. The method of claim 1262, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1279. The method of claim 1262. wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight. when calculated on an atomic basis. of the condensable hydrocarbons is oxygen.

1280. The method of claim 1262, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1281. The method of claim 1262, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1282. The method of claim 1262, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1283. The method of claim 1262, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1284. The method of claim 1262, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1285. The method of claim 1262, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1286. The method of claim 1262, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1287. The method of claim 1262, wherein the produced mixture comprises ammonia. and wherein the ammonia is used to produce fertilizer.

1288. The method of claim 1262, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1289. The method of claim 1262, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1290. The method of claim 1289, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

1291. The method of claim 1262, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1292. The method of claim 1262, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

1293. The method of claim 1262, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1294. The method of claim 1262, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1295. The method of claim 1262, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1296. The method of claim 1262, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1297. The method of claim 1262, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1298. The method of claim 1262, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1299. The method of claim 1262, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1300. The method of claim 1262, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1301. A method of treating a coal formation in situ, comprising:

raising a temperature of a first section of the formation with one or more heat sources to a first pyrolysis temperature;

heating the first section to an upper pyrolysis temperature, wherein heat is supplied to the first section at a rate configured to inhibit olefin production;

producing a first mixture from the formation, wherein the first mixture comprises condensable hydrocarbons and H_2;

creating a second mixture from the first mixture, wherein the second mixture comprises a higher concentration of H_2 than the first mixture;

raising a temperature of a second section of the formation with one or more heat sources to a second pyrolysis temperature;

providing a portion of the second mixture to the second section;

heating the second section to an upper pyrolysis temperature, wherein heat is supplied to the second section at a rate configured to inhibit olefin production; and

producing a third mixture from the second section.

1302. The method of claim 1301, wherein creating the second mixture comprises removing condensable hydrocarbons from the first mixture.

1303. The method of claim 1301, wherein creating the second mixture comprises removing water from the first mixture.

1304. The method of claim 1301, wherein creating the second mixture comprises removing carbon dioxide from the first mixture.

1305. The method of claim 1301, wherein the first pyrolysis temperature is greater than about 270 °C.

1306. The method of claim 1301, wherein the second pyrolysis temperature is greater than about 270 °C.

1307. The method of claim 1301, wherein the upper pyrolysis temperature is about 500 °C.

1308. The method of claim 1301, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat

sources pyrolyzes at least some hydrocarbons within the first or second selected section of the formation.

1309. The method of claim 1301, wherein the one or more heat sources comprise electrical heaters.

1310. The method of claim 1301, wherein the one or more heat sources comprise surface burners.

1311. The method of claim 1301, wherein the one or more heat sources comprise flameless distributed combustors.

1312. The method of claim 1301, wherein the one or more heat sources comprise natural distributed combustors.

1313. The method of claim 1301, further comprising controlling a pressure and a temperature within at least a majority of the first section and the second section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1314. The method of claim 1301, further comprising controlling the heat to the first and second sections such that an average heating rate of the first and second sections is less than about 1 °C per day during pyrolysis.

1315. The method of claim 1301, wherein heating the first and the second sections comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1316. The method of claim 1301, wherein heating the first and second sections comprises transferring heat substantially by conduction.

1317. The method of claim 1301, wherein heating the first and second sections comprises heating the first and second sections such that a thermal conductivity of at least a portion of the first and second sections is greater than about 0.5 W/(m °C).

1318. The method of claim 1301, wherein the first or third mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1319. The method of claim 1301, wherein the first or third mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1320. The method of claim 1301, wherein the first or third mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1321. The method of claim 1301, wherein the first or third mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1322. The method of claim 1301, wherein the first or third mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1323. The method of claim 1301, wherein the first or third mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1324. The method of claim 1301, wherein the first or third mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1325. The method of claim 1301, wherein the first or third mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1326. The method of claim 1301, wherein the first or third mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1327. The method of claim 1301, wherein the first or third mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1328. The method of claim 1301, wherein the first or third mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1329. The method of claim 1301, wherein the first or third mixture comprises a non-condensable component, and wherein the non-condensable component comprises hydrogen, and wherein the hydrogen is greater than about 10 % by volume of the non-condensable component and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1330. The method of claim 1301, wherein the first or third mixture comprises ammonia. and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1331. The method of claim 1301, wherein the first or third mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1332. The method of claim 1301, further comprising controlling a pressure within at least a majority of the first or second sections of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1333. The method of claim 1301, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1334. The method of claim 1333, wherein the partial pressure of H_2 within a mixture is measured when the mixture is at a production well.

1335. The method of claim 1301, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1336. The method of claim 1301, further comprising:

providing hydrogen (H_2) to the first or second section to hydrogenate hydrocarbons within the first or second section; and

heating a portion of the first or second section with heat from hydrogenation.

1337. The method of claim 1301, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1338. The method of claim 1301, further comprising increasing a permeability of a majority of the first or second section to greater than about 100 millidarcy.

1339. The method of claim 1301, further comprising substantially uniformly increasing a permeability of a majority of the first or second section.

1340. The method of claim 1301, wherein the heating is controlled to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1341. The method of claim 1301, wherein producing the first or third mixture comprises producing the first or third mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1342. The method of claim 1301, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1343. The method of claim 1301, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1344. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

producing a mixture from the formation; and

hydrogenating a portion of the produced mixture with H_2 produced from the formation.

1345. The method of claim 1344, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1346. The method of claim 1344, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

1347. The method of claim 1344, wherein the one or more heat sources comprise electrical heaters.

1348. The method of claim 1344, wherein the one or more heat sources comprise surface burners.

1349. The method of claim 1344, wherein the one or more heat sources comprise flameless distributed combustors.

1350. The method of claim 1344, wherein the one or more heat sources comprise natural distributed combustors.

1351. The method of claim 1344, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1352. The method of claim 1344, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1353. The method of claim 1344, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1354. The method of claim 1344, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1355. The method of claim 1344, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1356. The method of claim 1344, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1357. The method of claim 1344, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1358. The method of claim 1344, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1359. The method of claim 1344, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1360. The method of claim 1344, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1361. The method of claim 1344, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1362. The method of claim 1344, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1363. The method of claim 1344, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1364. The method of claim 1344, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1365. The method of claim 1344, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1366. The method of claim 1344, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1367. The method of claim 1344, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen. wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1368. The method of claim 1344, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1369. The method of claim 1344, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1370. The method of claim 1344, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1371. The method of claim 1344, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1372. The method of claim 1344, wherein the partial pressure of H2 within the mixture is measured when the mixture is at a production well.

1373. The method of claim 1344, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1374. The method of claim 1344, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1375. The method of claim 1344, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1376. The method of claim 1344, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1377. The method of claim 1344, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1378. The method of claim 1344, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1379. The method of claim 1344, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1380. The method of claim 1344, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1381. A method of treating a coal formation in situ, comprising:

heating a first section of the formation:

producing H_2 from the first section of formation;

heating a second section of the formation; and

recirculating a portion of the H_2 from the first section into the second section of the formation to provide a reducing environment within the second section of the formation.

1382. The method of claim 1381, wherein heating the first section or heating the second section comprises heating with an electrical heater.

1383. The method of claim 1381, wherein heating the first section or heating the second section comprises heating with a surface burner.

1384. The method of claim 1381, wherein heating the first section or heating the second section comprises heating with a flameless distributed combustor.

1385. The method of claim 1381, wherein heating the first section or heating the second section comprises heating with a natural distributed combustor.

1386. The method of claim 1381, further comprising controlling a pressure and a temperature within at least a majority of the first or second section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1387. The method of claim 1381, further comprising controlling the heat such that an average heating rate of the first or second section is less than about 1 °C per day during pyrolysis.

1388. The method of claim 1381, wherein heating the first section or heating the second section further comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation: and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1389. The method of claim 1381, wherein heating the first section or heating the second section comprises transferring heat substantially by conduction.

1390. The method of claim 1381, wherein heating the first section or heating the second section comprises heating the formation such that a thermal conductivity of at least a portion of the first or second section is greater than about 0.5 W/(m °C).

1391. The method of claim 1381, further comprising producing a mixture from the second section, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1392. The method of claim 1381, further comprising producing a mixture from the second section, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1393. The method of claim 1381, further comprising producing a mixture from the second section, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1394. The method of claim 1381, further comprising producing a mixture from the second section, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1395. The method of claim 1381, further comprising producing a mixture from the second section, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1396. The method of claim 1381, further comprising producing a mixture from the second section, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1397. The method of claim 1381, further comprising producing a mixture from the second section, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1398. The method of claim 1381, further comprising producing a mixture from the second section, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1399. The method of claim 1381, further comprising producing a mixture from the second section, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1400. The method of claim 1381, further comprising producing a mixture from the second section, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1401. The method of claim 1381, further comprising producing a mixture from the second section, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1402. The method of claim 1381, further comprising producing a mixture from the second section, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1403. The method of claim 1381, further comprising producing a mixture from the second section, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1404. The method of claim 1381, further comprising producing a mixture from the second section, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1405. The method of claim 1381, further comprising controlling a pressure within at least a majority of the first or second section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1406. The method of claim 1381, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1407. The method of claim 1406, wherein the partial pressure of H_2 within a mixture is measured when the mixture is at a production well.

1408. The method of claim 1381, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1409. The method of claim 1381, further comprising:

providing hydrogen (H_2) to the second section to hydrogenate hydrocarbons within the section; and

heating a portion of the second section with heat from hydrogenation.

1410. The method of claim 1381, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1411. The method of claim 1381, wherein heating the first section or heating the second section comprises increasing a permeability of a majority of the first or second section, respectively, to greater than about 100 millidarcy.

1412. The method of claim 1381, wherein heating the first section or heating the second section comprises substantially uniformly increasing a permeability of a majority of the first or second section, respectively.

1413. The method of claim 1381, further comprises controlling the heating of the first section or controlling the heat of the second section to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1414. The method of claim 1381, further comprising producing a mixture from the formation in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1415. The method of claim 1381, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1416. The method of claim 1381, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1417. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

producing a mixture from the formation; and

controlling formation conditions such that the mixture produced from the formation comprises condensable hydrocarbons including H_2, wherein the partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1418. The method of claim 1417, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1419. The method of claim 1417, wherein controlling formation conditions comprises maintaining a temperature within the selected section within a pyrolysis temperature range.

1420. The method of claim 1417, wherein the one or more heat sources comprise electrical heaters.

1421. The method of claim 1417, wherein the one or more heat sources comprise surface burners.

1422. The method of claim 1417, wherein the one or more heat sources comprise flameless distributed combustors.

1423. The method of claim 1417, wherein the one or more heat sources comprise natural distributed combustors.

1424. The method of claim 1417, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1425. The method of claim 1417, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1426. The method of claim 1417, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than *Pwr*, wherein *Pwr* is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein *Pwr* is the heating energy/day, *h* is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1427. The method of claim 1417, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1428. The method of claim 1417, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1429. The method of claim 1417, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1430. The method of claim 1417, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1431. The method of claim 1417, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1432. The method of claim 1417, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1433. The method of claim 1417, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1434. The method of claim 1417, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1435. The method of claim 1417, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1436. The method of claim 1417, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1437. The method of claim 1417, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1438. The method of claim 1417, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1439. The method of claim 1417, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1440. The method of claim 1417, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen,

wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1441. The method of claim 1417, wherein the produced mixture comprises ammonia. and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1442. The method of claim 1417, wherein the produced mixture comprises ammonia. and wherein the ammonia is used to produce fertilizer.

1443. The method of claim 1417, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1444. The method of claim 1417, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1445. The method of claim 1417, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

1446. The method of claim 1417, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1447. The method of claim 1417, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1448. The method of claim 1417, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1449. The method of claim 1417, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1450. The method of claim 1417, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1451. The method of claim 1417, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1452. The method of claim 1417, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1453. The method of claim 1417, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1454. The method of claim 1417, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

1455. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

maintaining a pressure of the selected section above atmospheric pressure to increase a partial pressure of H_2, as compared to the partial pressure of H_2 at atmospheric pressure, in at least a majority of the selected section; and

producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1456. The method of claim 1455, wherein the one or more heat sources comprise at least two heat sources. and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1457. The method of claim 1455, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

1458. The method of claim 1455, wherein the one or more heat sources comprise electrical heaters.

1459. The method of claim 1455, wherein the one or more heat sources comprise surface burners.

1460. The method of claim 1455, wherein the one or more heat sources comprise flameless distributed combustors.

1461. The method of claim 1455, wherein the one or more heat sources comprise natural distributed combustors.

1462. The method of claim 1455, further comprising controlling the pressure and a temperature within at least a majority of the selected section of the formation, wherein

the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1463. The method of claim 1455, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1464. The method of claim 1455, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1465. The method of claim 1455, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1466. The method of claim 1455, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1467. The method of claim 1455, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1468. The method of claim 1455, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1469. The method of claim 1455, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1470. The method of claim 1455, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1471. The method of claim 1455, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1472. The method of claim 1455, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1473. The method of claim 1455, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1474. The method of claim 1455, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1475. The method of claim 1455, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1476. The method of claim 1455, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1477. The method of claim 1455, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1478. The method of claim 1455, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1479. The method of claim 1455, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1480. The method of claim 1455, further comprising controlling the pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1481. The method of claim 1455, further comprising increasing the pressure of the selected section, to an upper limit of about 21 bar absolute, to increase an amount of non-condensable hydrocarbons produced from the formation.

1482. The method of claim 1455, further comprising decreasing pressure of the selected section, to a lower limit of about atmospheric pressure, to increase an amount of condensable hydrocarbons produced from the formation.

1483. The method of claim 1455, wherein the partial pressure comprises a partial pressure based on properties measured at a production well.

1484. The method of claim 1455, further comprising altering the pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1485. The method of claim 1455, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

1486. The method of claim 1455, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1487. The method of claim 1455, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1488. The method of claim 1455, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1489. The method of claim 1455, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1490. The method of claim 1455, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1491. The method of claim 1455, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1492. The method of claim 1455, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1493. The method of claim 1455, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1494. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

providing H_2 to the formation to produce a reducing environment in at least some of the formation;

producing a mixture from the formation.

1495. The method of claim 1494, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1496. The method of claim 1494, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

1497. The method of claim 1494, further comprising separating a portion of hydrogen within the mixture and recirculating the portion into the formation.

1498. The method of claim 1494, wherein the one or more heat sources comprise electrical heaters.

1499. The method of claim 1494, wherein the one or more heat sources comprise surface burners.

1500. The method of claim 1494, wherein the one or more heat sources comprise flameless distributed combustors.

1501. The method of claim 1494, wherein the one or more heat sources comprise natural distributed combustors.

1502. The method of claim 1494, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1503. The method of claim 1494, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1504. The method of claim 1494, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than *Pwr*, wherein *Pwr* is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein *Pwr* is the heating energy/day, *h* is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1505. The method of claim 1494, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1506. The method of claim 1494, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1507. The method of claim 1494, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1508. The method of claim 1494, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1509. The method of claim 1494, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1510. The method of claim 1494, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1511. The method of claim 1494, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1512. The method of claim 1494, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1513. The method of claim 1494, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1514. The method of claim 1494, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1515. The method of claim 1494, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1516. The method of claim 1494, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1517. The method of claim 1494, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1518. The method of claim 1494, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen,

wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1519. The method of claim 1494, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1520. The method of claim 1494, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1521. The method of claim 1494, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1522. The method of claim 1494, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1523. The method of claim 1494, wherein the partial pressure of H2 within the mixture is measured when the mixture is at a production well.

1524. The method of claim 1494, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1525. The method of claim 1494, wherein providing hydrogen (H_2) to the formation further comprises:

hydrogenating hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1526. The method of claim 1494, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1527. The method of claim 1494, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1528. The method of claim 1494, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1529. The method of claim 1494, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1530. The method of claim 1494, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1531. The method of claim 1494, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1532. The method of claim 1494, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1533. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

providing H_2 to the selected section to hydrogenate hydrocarbons within the selected section and to heat a portion of the section with heat from the hydrogenation: and

controlling heating of the selected section by controlling amounts of H_2 provided to the selected section.

1534. The method of claim 1533, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1535. The method of claim 1533, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

1536. The method of claim 1533, wherein the one or more heat sources comprise electrical heaters.

1537. The method of claim 1533, wherein the one or more heat sources comprise surface burners.

1538. The method of claim 1533, wherein the one or more heat sources comprise flameless distributed combustors.

1539. The method of claim 1533, wherein the one or more heat sources comprise natural distributed combustors.

1540. The method of claim 1533, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1541. The method of claim 1533, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1542. The method of claim 1533, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1543. The method of claim 1533, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1544. The method of claim 1533, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1545. The method of claim 1533, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1546. The method of claim 1533, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1547. The method of claim 1533, further comprising producing a mixture from the formation, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1548. The method of claim 1533, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1549. The method of claim 1533, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1550. The method of claim 1533, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1551. The method of claim 1533, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1552. The method of claim 1533, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons. and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1553. The method of claim 1533, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1554. The method of claim 1533, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons. and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1555. The method of claim 1533, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1556. The method of claim 1533, further comprising producing a mixture from the formation, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1557. The method of claim 1533, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1558. The method of claim 1533, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1559. The method of claim 1533, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1560. The method of claim 1533, further comprising controlling formation conditions to produce a mixture from the formation, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1561. The method of claim 1560, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

1562. The method of claim 1533, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1563. The method of claim 1533, further comprising controlling formation conditions by recirculating a portion of hydrogen from a produced mixture into the formation.

1564. The method of claim 1533, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1565. The method of claim 1533, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1566. The method of claim 1533, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1567. The method of claim 1533, wherein the heating is controlled of claim 1533, further comprising producing a mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1568. The method of claim 1533, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1569. The method of claim 1533, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1570. An in situ method for producing H_2 from a coal formation, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation; and

producing a mixture from the formation, wherein a H_2 partial pressure within the mixture is greater than about 0.5 bar.

1571. The method of claim 1570, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1572. The method of claim 1570, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

1573. The method of claim 1570, wherein the one or more heat sources comprise electrical heaters.

1574. The method of claim 1570, wherein the one or more heat sources comprise surface burners.

1575. The method of claim 1570, wherein the one or more heat sources comprise flameless distributed combustors.

1576. The method of claim 1570, wherein the one or more heat sources comprise natural distributed combustors.

1577. The method of claim 1570, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1578. The method of claim 1570, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1579. The method of claim 1570, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation: and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$Pwr = h{*}V{*}C_v{*}\rho_B$

wherein *Pwr* is the heating energy/day, *h* is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1580. The method of claim 1570, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1581. The method of claim 1570, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1582. The method of claim 1570, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1583. The method of claim 1570, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1584. The method of claim 1570, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1585. The method of claim 1570, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1586. The method of claim 1570, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1587. The method of claim 1570, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1588. The method of claim 1570, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1589. The method of claim 1570, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1590. The method of claim 1570, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1591. The method of claim 1570, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1592. The method of claim 1570, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1593. The method of claim 1570, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1594. The method of claim 1570, wherein the produced mixture comprises ammonia. and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1595. The method of claim 1570, wherein the produced mixture comprises ammonia. and wherein the ammonia is used to produce fertilizer.

1596. The method of claim 1570, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1597. The method of claim 1570, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1598. The method of claim 1570, further comprising recirculating a portion of the hydrogen within the mixture into the formation.

1599. The method of claim 1570, further comprising condensing a hydrocarbon component from the produced mixture and hydrogenating the condensed hydrocarbons with a portion of the hydrogen.

1600. The method of claim 1570, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1601. The method of claim 1570, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1602. The method of claim 1570, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1603. The method of claim 1570, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1604. The method of claim 1570, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1605. The method of claim 1570, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1606. The method of claim 1570, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1607. The method of claim 1570, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

1608. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

wherein the selected section has been selected for heating using an atomic hydrogen weight percentage of at least a portion of hydrocarbons in the selected section.

and wherein at least the portion of the hydrocarbons in the selected section comprises an atomic hydrogen weight percentage, when measured on a dry, ash-free basis, of greater than about 4.0 %; and

producing a mixture from the formation.

1609. The method of claim 1608, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1610. The method of claim 1608, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

1611. The method of claim 1608, wherein the one or more heat sources comprise electrical heaters.

1612. The method of claim 1608, wherein the one or more heat sources comprise surface burners.

1613. The method of claim 1608, wherein the one or more heat sources comprise flameless distributed combustors.

1614. The method of claim 1608, wherein the one or more heat sources comprise natural distributed combustors.

1615. The method of claim 1608, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1616. The method of claim 1608, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1617. The method of claim 1608, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1618. The method of claim 1608, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1619. The method of claim 1608, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1620. The method of claim 1608, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1621. The method of claim 1608, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1622. The method of claim 1608, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1623. The method of claim 1608, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1624. The method of claim 1608, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1625. The method of claim 1608, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1626. The method of claim 1608, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1627. The method of claim 1608, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1628. The method of claim 1608, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1629. The method of claim 1608, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1630. The method of claim 1608, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1631. The method of claim 1608, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1632. The method of claim 1608, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1633. The method of claim 1608, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1634. The method of claim 1608, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1635. The method of claim 1608, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1636. The method of claim 1635, wherein the partial pressure of H2 within the mixture is measured when the mixture is at a production well.

1637. The method of claim 1608, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1638. The method of claim 1608, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

1639. The method of claim 1608, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1640. The method of claim 1608, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1641. The method of claim 1608, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1642. The method of claim 1608, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1643. The method of claim 1608, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1644. The method of claim 1608, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1645. The method of claim 1608, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1646. The method of claim 1608, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1647. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

wherein at least some hydrocarbons within the selected section have an initial atomic hydrogen weight percentage of greater than about 4.0 %; and

producing a mixture from the formation.

1648. The method of claim 1647, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1649. The method of claim 1647, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

1650. The method of claim 1647, wherein the one or more heat sources comprise electrical heaters.

1651. The method of claim 1647, wherein the one or more heat sources comprise surface burners.

1652. The method of claim 1647, wherein the one or more heat sources comprise flameless distributed combustors.

1653. The method of claim 1647, wherein the one or more heat sources comprise natural distributed combustors.

1654. The method of claim 1647, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1655. The method of claim 1647, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1656. The method of claim 1647, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than *Pwr*, wherein *Pwr* is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein *Pwr* is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1657. The method of claim 1647, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1658. The method of claim 1647, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1659. The method of claim 1647, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1660. The method of claim 1647, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1661. The method of claim 1647, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1662. The method of claim 1647, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1663. The method of claim 1647, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1664. The method of claim 1647, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1665. The method of claim 1647, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable

hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1666. The method of claim 1647, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1667. The method of claim 1647, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1668. The method of claim 1647, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1669. The method of claim 1647, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1670. The method of claim 1647, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1671. The method of claim 1647, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1672. The method of claim 1647, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1673. The method of claim 1647, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1674. The method of claim 1647, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1675. The method of claim 1674, wherein the partial pressure of H2 within the mixture is measured when the mixture is at a production well.

1676. The method of claim 1647, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1677. The method of claim 1647, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

1678. The method of claim 1647, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1679. The method of claim 1647, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1680. The method of claim 1647, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1681. The method of claim 1647, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1682. The method of claim 1647, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1683. The method of claim 1647, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1684. The method of claim 1647, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1685. The method of claim 1647, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1686. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

wherein the selected section has been selected for heating using vitrinite reflectance of at least some hydrocarbons in the selected section, and wherein at least a portion of the hydrocarbons in the selected section comprises a vitrinite reflectance of greater than about 0.3 %;

wherein at least a portion of the hydrocarbons in the selected section comprises a vitrinite reflectance of less than about 4.5 %; and

producing a mixture from the formation.

1687. The method of claim 1686, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1688. The method of claim 1686, further comprising maintaining a temperature within the selected section within a pyrolysis temperature.

1689. The method of claim 1686, wherein the vitrinite reflectance of at least the portion of hydrocarbons within the selected section is between about 0.47 % and about 1.5 % such that a majority of the produced mixture comprises condensable hydrocarbons.

1690. The method of claim 1686, wherein the vitrinite reflectance of at least the portion of hydrocarbons within the selected section is between about 1.4 % and about 4.2 % such that a majority of the produced mixture comprises non-condensable hydrocarbons.

1691. The method of claim 1686, wherein the one or more heat sources comprise electrical heaters.

1692. The method of claim 1686, wherein the one or more heat sources comprise surface burners.

1693. The method of claim 1686, wherein the one or more heat sources comprise flameless distributed combustors.

1694. The method of claim 1686, wherein the one or more heat sources comprise natural distributed combustors.

1695. The method of claim 1686, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1696. The method of claim 1686, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1697. The method of claim 1686, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1698. The method of claim 1686, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1699. The method of claim 1686, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1700. The method of claim 1686, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1701. The method of claim 1686, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1702. The method of claim 1686, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1703. The method of claim 1686, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1704. The method of claim 1686, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1705. The method of claim 1686, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1706. The method of claim 1686, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1707. The method of claim 1686, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1708. The method of claim 1686, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1709. The method of claim 1686, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1710. The method of claim 1686, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1711. The method of claim 1686, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1712. The method of claim 1686, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1713. The method of claim 1686, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1714. The method of claim 1686, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1715. The method of claim 1686, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1716. The method of claim 1715, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

1717. The method of claim 1686, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1718. The method of claim 1686, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

1719. The method of claim 1686, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1720. The method of claim 1686, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1721. The method of claim 1686, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1722. The method of claim 1686, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1723. The method of claim 1686, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1724. The method of claim 1686, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1725. The method of claim 1686, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1726. The method of claim 1686, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1727. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

wherein the selected section has been selected for heating using a total organic matter weight percentage of at least a portion of the selected section, and wherein at least the portion of the selected section comprises a total organic matter weight percentage, of at least about 5.0 %; and

producing a mixture from the formation.

1728. The method of claim 1727, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1729. The method of claim 1727, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

1730. The method of claim 1727, wherein the one or more heat sources comprise electrical heaters.

1731. The method of claim 1727, wherein the one or more heat sources comprise surface burners.

1732. The method of claim 1727, wherein the one or more heat sources comprise flameless distributed combustors.

1733. The method of claim 1727, wherein the one or more heat sources comprise natural distributed combustors.

1734. The method of claim 1727, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1735. The method of claim 1727, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1736. The method of claim 1727, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation: and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$Pwr = h*V*C_v*\rho_B$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1737. The method of claim 1727, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1738. The method of claim 1727, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1739. The method of claim 1727, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1740. The method of claim 1727, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1741. The method of claim 1727, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1742. The method of claim 1727, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1743. The method of claim 1727, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1744. The method of claim 1727, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1745. The method of claim 1727, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1746. The method of claim 1727, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1747. The method of claim 1727, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1748. The method of claim 1727, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1749. The method of claim 1727, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1750. The method of claim 1727, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1751. The method of claim 1727, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1752. The method of claim 1727, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1753. The method of claim 1727, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1754. The method of claim 1727, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1755. The method of claim 1754, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

1756. The method of claim 1727, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1757. The method of claim 1727, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

1758. The method of claim 1727, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1759. The method of claim 1727, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1760. The method of claim 1727, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1761. The method of claim 1727, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1762. The method of claim 1727, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1763. The method of claim 1727, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1764. The method of claim 1727, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1765. The method of claim 1727, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1766. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

wherein at least some hydrocarbons within the selected section have an initial total organic matter weight percentage of at least about 5.0%; and

producing a mixture from the formation.

1767. The method of claim 1766, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1768. The method of claim 1766, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

1769. The method of claim 1766, wherein the one or more heat sources comprise electrical heaters.

1770. The method of claim 1766, wherein the one or more heat sources comprise surface burners.

1771. The method of claim 1766, wherein the one or more heat sources comprise flameless distributed combustors.

1772. The method of claim 1766, wherein the one or more heat sources comprise natural distributed combustors.

1773. The method of claim 1766, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1774. The method of claim 1766, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1775. The method of claim 1766, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1776. The method of claim 1766, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1777. The method of claim 1766, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1778. The method of claim 1766, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1779. The method of claim 1766, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1780. The method of claim 1766, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1781. The method of claim 1766, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1782. The method of claim 1766, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1783. The method of claim 1766, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1784. The method of claim 1766, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1785. The method of claim 1766, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1786. The method of claim 1766, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1787. The method of claim 1766, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1788. The method of claim 1766, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1789. The method of claim 1766, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1790. The method of claim 1766, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1791. The method of claim 1766, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1792. The method of claim 1766, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1793. The method of claim 1766, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1794. The method of claim 1793, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

1795. The method of claim 1766, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1796. The method of claim 1766, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

1797. The method of claim 1766, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1798. The method of claim 1766, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1799. The method of claim 1766, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1800. The method of claim 1766, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1801. The method of claim 1766, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1802. The method of claim 1766, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1803. The method of claim 1766, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1804. The method of claim 1766, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1805. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

wherein the selected section has been selected for heating using an atomic oxygen weight percentage of at least a portion of hydrocarbons in the selected section. and wherein at least a portion of the hydrocarbons in the selected section comprises an atomic oxygen weight percentage of less than about 15% when measured on a dry, ash free basis; and

producing a mixture from the formation.

1806. The method of claim 1805, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1807. The method of claim 1805, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

1808. The method of claim 1805, wherein the one or more heat sources comprise electrical heaters.

1809. The method of claim 1805, wherein the one or more heat sources comprise surface burners.

1810. The method of claim 1805, wherein the one or more heat sources comprise flameless distributed combustors.

1811. The method of claim 1805, wherein the one or more heat sources comprise natural distributed combustors.

1812. The method of claim 1805, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1813. The method of claim 1805, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1814. The method of claim 1805, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein *Pwr* is the heating energy/day, *h* is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1815. The method of claim 1805, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1816. The method of claim 1805, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1817. The method of claim 1805, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1818. The method of claim 1805, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1819. The method of claim 1805, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1820. The method of claim 1805, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1821. The method of claim 1805, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1822. The method of claim 1805, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1823. The method of claim 1805, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1824. The method of claim 1805, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1825. The method of claim 1805, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1826. The method of claim 1805, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1827. The method of claim 1805, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1828. The method of claim 1805, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1829. The method of claim 1805, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1830. The method of claim 1805, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1831. The method of claim 1805, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1832. The method of claim 1805, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1833. The method of claim 1832, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

1834. The method of claim 1805, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1835. The method of claim 1805, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

1836. The method of claim 1805, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1837. The method of claim 1805, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1838. The method of claim 1805, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1839. The method of claim 1805, wherein allowing the heat to transfer further comprises substantially uniformly increasing a permeability of a majority of the selected section.

1840. The method of claim 1805, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1841. The method of claim 1805, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1842. The method of claim 1805, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1843. The method of claim 1805, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1844. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to a selected section of the formation;

allowing the heat to transfer from the one or more heat sources to the selected section of the formation to pyrolyze hydrocarbon within the selected section;

wherein at least some hydrocarbons within the selected section have an initial atomic oxygen weight percentage of less than about 15%; and

producing a mixture from the formation.

1845. The method of claim 1844, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1846. The method of claim 1844, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range

1847. The method of claim 1844, wherein the one or more heat sources comprise electrical heaters.

1848. The method of claim 1844, wherein the one or more heat sources comprise surface burners.

1849. The method of claim 1844, wherein the one or more heat sources comprise flameless distributed combustors.

1850. The method of claim 1844, wherein the one or more heat sources comprise natural distributed combustors.

1851. The method of claim 1844, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein

the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1852. The method of claim 1844, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1853. The method of claim 1844, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1854. The method of claim 1844, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1855. The method of claim 1844, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1856. The method of claim 1844, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1857. The method of claim 1844, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1858. The method of claim 1844, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1859. The method of claim 1844, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1860. The method of claim 1844, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1861. The method of claim 1844, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1862. The method of claim 1844, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1863. The method of claim 1844, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1864. The method of claim 1844, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1865. The method of claim 1844, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1866. The method of claim 1844, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1867. The method of claim 1844, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1868. The method of claim 1844, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1869. The method of claim 1844, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1870. The method of claim 1844, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1871. The method of claim 1844, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1872. The method of claim 1871, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

1873. The method of claim 1844, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1874. The method of claim 1844, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

1875. The method of claim 1844, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1876. The method of claim 1844, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1877. The method of claim 1844, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1878. The method of claim 1844, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1879. The method of claim 1844, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1880. The method of claim 1844, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1881. The method of claim 1844, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1882. The method of claim 1844, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1883. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

wherein the selected section has been selected for heating using an atomic hydrogen to carbon ratio of at least a portion of hydrocarbons in the selected section, wherein at least a portion of the hydrocarbons in the selected section comprises an atomic hydrogen to carbon ratio greater than about 0.70, and wherein the atomic hydrogen to carbon ratio is less than about 1.65; and

producing a mixture from the formation.

1884. The method of claim 1883, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1885. The method of claim 1883, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

1886. The method of claim 1883, wherein the one or more heat sources comprise electrical heaters.

1887. The method of claim 1883, wherein the one or more heat sources comprise surface burners.

1888. The method of claim 1883, wherein the one or more heat sources comprise flameless distributed combustors.

1889. The method of claim 1883, wherein the one or more heat sources comprise natural distributed combustors.

1890. The method of claim 1883, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1891. The method of claim 1883, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1892. The method of claim 1883, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than *Pwr*, wherein *Pwr* is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein *Pwr* is the heating energy/day, *h* is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1893. The method of claim 1883, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1894. The method of claim 1883, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1895. The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1896. The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1897. The method of claim 1883, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1898. The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1899. The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1900. The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1901. The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1902. The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1903. The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1904. The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1905. The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1906. The method of claim 1883, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen,

wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1907. The method of claim 1883, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1908. The method of claim 1883, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1909. The method of claim 1883, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1910. The method of claim 1883, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1911. The method of claim 1910, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

1912. The method of claim 1883, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1913. The method of claim 1883. further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

1914. The method of claim 1883, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1915. The method of claim 1883, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1916. The method of claim 1883, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1917. The method of claim 1883, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1918. The method of claim 1883, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1919. The method of claim 1883, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1920. The method of claim 1883, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1921. The method of claim 1883, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1922. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to a selected section of the formation;

allowing the heat to transfer from the one or more heat sources to the selected section of the formation to pyrolyze hydrocarbons within the selected section;

wherein at least some hydrocarbons within the selected section have an initial atomic hydrogen to carbon ratio greater than about 0.70;

wherein the initial atomic hydrogen to carbon ration is less than about 1.65; and

producing a mixture from the formation.

1923. The method of claim 1922, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1924. The method of claim 1922, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

1925. The method of claim 1922, wherein the one or more heat sources comprise electrical heaters.

1926. The method of claim 1922, wherein the one or more heat sources comprise surface burners.

1927. The method of claim 1922, wherein the one or more heat sources comprise flameless distributed combustors.

1928. The method of claim 1922, wherein the one or more heat sources comprise natural distributed combustors.

1929. The method of claim 1922, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1930. The method of claim 1922, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1931. The method of claim 1922, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1932. The method of claim 1922, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1933. The method of claim 1922, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1934. The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1935. The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1936. The method of claim 1922, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1937. The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1938. The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1939. The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1940. The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1941. The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1942. The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1943. The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1944. The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1945. The method of claim 1922, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1946. The method of claim 1922, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1947. The method of claim 1922, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1948. The method of claim 1922, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1949. The method of claim 1922, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1950. The method of claim 1949, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

1951. The method of claim 1922, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1952. The method of claim 1922, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

1953. The method of claim 1922, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1954. The method of claim 1922, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1955. The method of claim 1922, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1956. The method of claim 1922, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

1957. The method of claim 1922, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1958. The method of claim 1922. wherein producing the mixture comprises producing the mixture in a production well. and wherein at least about 7 heat sources are disposed in the formation for each production well.

1959. The method of claim 1922, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1960. The method of claim 1922, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1961. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

wherein the selected section has been selected for heating using an atomic oxygen to carbon ratio of at least a portion of hydrocarbons in the selected section. wherein at least a portion of the hydrocarbons in the selected section comprises an atomic oxygen to carbon ratio greater than about 0.025, and wherein the atomic oxygen to carbon ratio of at least a portion of the hydrocarbons in the selected section is less than about 0.15 and

producing a mixture from the formation.

1962. The method of claim 1961, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

1963. The method of claim 1961, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

1964. The method of claim 1961, wherein the one or more heat sources comprise electrical heaters.

1965. The method of claim 1961, wherein the one or more heat sources comprise surface burners.

1966. The method of claim 1961, wherein the one or more heat sources comprise flameless distributed combustors.

1967. The method of claim 1961, wherein the one or more heat sources comprise natural distributed combustors.

1968. The method of claim 1961, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1969. The method of claim 1961, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

1970. The method of claim 1961, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources. wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

1971. The method of claim 1961, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1972. The method of claim 1961, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

1973. The method of claim 1961, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1974. The method of claim 1961, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1975. The method of claim 1961, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1976. The method of claim 1961, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1977. The method of claim 1961, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1978. The method of claim 1961, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1979. The method of claim 1961, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1980. The method of claim 1961, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1981. The method of claim 1961, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1982. The method of claim 1961, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1983. The method of claim 1961, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1984. The method of claim 1961, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen,

wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1985. The method of claim 1961, wherein the produced mixture comprises ammonia. and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1986. The method of claim 1961, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1987. The method of claim 1961, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1988. The method of claim 1961, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1989. The method of claim 1988, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

1990. The method of claim 1961, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1991. The method of claim 1961. further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

1992. The method of claim 1961, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

1993. The method of claim 1961, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1994. The method of claim 1961, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

1995. The method of claim 1961, wherein allowing the heat to transfer further comprises substantially uniformly increasing a permeability of a majority of the selected section.

1996. The method of claim 1961, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

1997. The method of claim 1961, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

1998. The method of claim 1961, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

1999. The method of claim 1961, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat

sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2000. A method of treating a coal formation in situ, comprising

providing heat from one or more heat sources to a selected section of the formation;

allowing the heat to transfer from the one or more heat sources to the selected section of the formation to pyrolyze hydrocarbons within the selected section;

wherein at least some hydrocarbons within the selected section have an initial atomic oxygen to carbon ratio greater than about 0.025;

wherein the initial atomic oxygen to carbon ratio is less than about 0.15; and

producing a mixture from the formation.

2001. The method of claim 2000, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

2002. The method of claim 2000, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

2003. The method of claim 2000, wherein the one or more heat sources comprise electrical heaters.

2004. The method of claim 2000, wherein the one or more heat sources comprise surface burners.

2005. The method of claim 2000, wherein the one or more heat sources comprise flameless distributed combustors.

2006. The method of claim 2000, wherein the one or more heat sources comprise natural distributed combustors.

2007. The method of claim 2000, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2008. The method of claim 2000, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

2009. The method of claim 2000, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation: and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2010. The method of claim 2000, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

2011. The method of claim 2000, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

2012. The method of claim 2000, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2013. The method of claim 2000, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2014. The method of claim 2000, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2015. The method of claim 2000, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2016. The method of claim 2000, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2017. The method of claim 2000, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2018. The method of claim 2000, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2019. The method of claim 2000, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2020. The method of claim 2000, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2021. The method of claim 2000, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2022. The method of claim 2000, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2023. The method of claim 2000, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2024. The method of claim 2000, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2025. The method of claim 2000, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2026. The method of claim 2000, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2027. The method of claim 2000, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2028. The method of claim 2027, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2029. The method of claim 2000, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2030. The method of claim 2000, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2031. The method of claim 2000, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

2032. The method of claim 2000, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2033. The method of claim 2000, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

2034. The method of claim 2000, wherein allowing the heat to transfer further comprises substantially uniformly increasing a permeability of a majority of the selected section.

2035. The method of claim 2000, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2036. The method of claim 2000, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

2037. The method of claim 2000, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2038. The method of claim 2000, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2039. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation:

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

wherein the selected section has been selected for heating using a moisture content in the selected section, and wherein at least a portion of the selected section comprises a moisture content of less than about 15%; and

producing a mixture from the formation.

2040. The method of claim 2039, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat

sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

2041. The method of claim 2039, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

2042. The method of claim 2039, wherein the one or more heat sources comprise electrical heaters.

2043. The method of claim 2039, wherein the one or more heat sources comprise surface burners.

2044. The method of claim 2039, wherein the one or more heat sources comprise flameless distributed combustors.

2045. The method of claim 2039, wherein the one or more heat sources comprise natural distributed combustors.

2046. The method of claim 2039, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2047. The method of claim 2039, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

2048. The method of claim 2039, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2049. The method of claim 2039, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

2050. The method of claim 2039, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

2051. The method of claim 2039, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2052. The method of claim 2039, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2053. The method of claim 2039, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2054. The method of claim 2039, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2055. The method of claim 2039, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2056. The method of claim 2039, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2057. The method of claim 2039, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2058. The method of claim 2039, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2059. The method of claim 2039, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2060. The method of claim 2039, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2061. The method of claim 2039, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2062. The method of claim 2039, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2063. The method of claim 2039, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2064. The method of claim 2039, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2065. The method of claim 2039, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2066. The method of claim 2039, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2067. The method of claim 2066, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2068. The method of claim 2039, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2069. The method of claim 2039, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2070. The method of claim 2039, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

2071. The method of claim 2039, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2072. The method of claim 2039, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

2073. The method of claim 2039, wherein allowing the heat to transfer further comprises substantially uniformly increasing a permeability of a majority of the selected section.

2074. The method of claim 2039, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2075. The method of claim 2039, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

2076. The method of claim 2039, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2077. The method of claim 2039, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat

sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2078. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to a selected section of the formation;

allowing the heat to transfer from the one or more heat sources to the selected section of the formation;

wherein at least a portion of the selected section has an initial moisture content of less than about 15%; and

producing a mixture from the formation.

2079. The method of claim 2078, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

2080. The method of claim 2078, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

2081. The method of claim 2078, wherein the one or more heat sources comprise electrical heaters.

2082. The method of claim 2078, wherein the one or more heat sources comprise surface burners.

2083. The method of claim 2078, wherein the one or more heat sources comprise flameless distributed combustors.

2084. The method of claim 2078, wherein the one or more heat sources comprise natural distributed combustors.

2085. The method of claim 2078, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2086. The method of claim 2078, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

2087. The method of claim 2078, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2088. The method of claim 2078, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

2089. The method of claim 2078, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

2090. The method of claim 2078, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2091. The method of claim 2078, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2092. The method of claim 2078, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2093. The method of claim 2078, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2094. The method of claim 2078, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2095. The method of claim 2078, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2096. The method of claim 2078, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2097. The method of claim 2078, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2098. The method of claim 2078, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2099. The method of claim 2078, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2100. The method of claim 2078, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2101. The method of claim 2078, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2102. The method of claim 2078, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2103. The method of claim 2078, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2104. The method of claim 2078, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2105. The method of claim 2078, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2106. The method of claim 2105, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2107. The method of claim 2078, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2108. The method of claim 2078, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2109. The method of claim 2078, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

2110. The method of claim 2078, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2111. The method of claim 2078, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

2112. The method of claim 2078, wherein allowing the heat to transfer further comprises substantially uniformly increasing a permeability of a majority of the selected section.

2113. The method of claim 2078, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2114. The method of claim 2078, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

2115. The method of claim 2078, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2116. The method of claim 2078, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2117. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation;

wherein the selected section is heated in a reducing environment during at least a portion of the time that the selected section is being heated; and

producing a mixture from the formation.

2118. The method of claim 2117, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat

sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

2119. The method of claim 2117, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

2120. The method of claim 2117, wherein the one or more heat sources comprise electrical heaters.

2121. The method of claim 2117, wherein the one or more heat sources comprise surface burners.

2122. The method of claim 2117, wherein the one or more heat sources comprise flameless distributed combustors.

2123. The method of claim 2117, wherein the one or more heat sources comprise natural distributed combustors.

2124. The method of claim 2117, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2125. The method of claim 2117, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

2126. The method of claim 2117, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2127. The method of claim 2117, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

2128. The method of claim 2117, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

2129. The method of claim 2117, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2130. The method of claim 2117, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2131. The method of claim 2117, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2132. The method of claim 2117, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2133. The method of claim 2117, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2134. The method of claim 2117, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2135. The method of claim 2117, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2136. The method of claim 2117, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2137. The method of claim 2117, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2138. The method of claim 2117, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2139. The method of claim 2117, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2140. The method of claim 2117, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2141. The method of claim 2117, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2142. The method of claim 2117, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2143. The method of claim 2117, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2144. The method of claim 2117, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2145. The method of claim 2144, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2146. The method of claim 2117, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2147. The method of claim 2117, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2148. The method of claim 2117, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

2149. The method of claim 2117, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2150. The method of claim 2117, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

2151. The method of claim 2117, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

2152. The method of claim 2117, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2153. The method of claim 2117, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

2154. The method of claim 2117, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2155. The method of claim 2117, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat

sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2156. A method of treating a coal formation in situ, comprising:

heating a first section of the formation to produce a mixture from the formation;

heating a second section of the formation; and

recirculating a portion of the produced mixture from the first section into the second section of the formation to provide a reducing environment within the second section of the formation.

2157. The method of claim 2156, further comprising maintaining a temperature within the first section or the second section within a pyrolysis temperature range.

2158. The method of claim 2156, wherein heating the first or the second section comprises heating with an electrical heater.

2159. The method of claim 2156, wherein heating the first or the second section comprises heating with a surface burner.

2160. The method of claim 2156, wherein heating the first or the second section comprises heating with a flameless distributed combustor.

2161. The method of claim 2156, wherein heating the first or the second section comprises heating with a natural distributed combustor.

2162. The method of claim 2156, further comprising controlling a pressure and a temperature within at least a majority of the first or second section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2163. The method of claim 2156, further comprising controlling the heat such that an average heating rate of the first or the second section is less than about 1 °C per day during pyrolysis.

2164. The method of claim 2156, wherein heating the first or the second section comprises:

heating a selected volume (V) of the coal formation from one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2165. The method of claim 2156, wherein heating the first or the second section comprises transferring heat substantially by conduction.

2166. The method of claim 2156, wherein heating the first or the second section comprises heating the first or the second section such that a thermal conductivity of at least a portion of the first or the second section is greater than about 0.5 W/(m °C).

2167. The method of claim 2156, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2168. The method of claim 2156, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2169. The method of claim 2156, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2170. The method of claim 2156, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2171. The method of claim 2156, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2172. The method of claim 2156, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2173. The method of claim 2156, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2174. The method of claim 2156, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2175. The method of claim 2156, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2176. The method of claim 2156, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2177. The method of claim 2156, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2178. The method of claim 2156, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2179. The method of claim 2156, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2180. The method of claim 2156, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2181. The method of claim 2156, further comprising controlling a pressure within at least a majority of the first or second section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2182. The method of claim 2156, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2183. The method of claim 2182, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2184. The method of claim 2156, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2185. The method of claim 2156, further comprising:

providing hydrogen (H_2) to the first or second section to hydrogenate hydrocarbons within the first or second section; and

heating a portion of the first or second section with heat from hydrogenation.

2186. The method of claim 2156, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2187. The method of claim 2156, wherein heating the first or the second section comprises increasing a permeability of a majority of the first or the second section to greater than about 100 millidarcy.

2188. The method of claim 2156, wherein heating the first or the second section comprises substantially uniformly increasing a permeability of a majority of the first or the second section.

2189. The method of claim 2156, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2190. The method of claim 2156, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

2191. The method of claim 2156, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat

sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2192. The method of claim 2156, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2193. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation; and

allowing the heat to transfer from the one or more heat sources to a selected section of the formation such that a permeability of at least a portion of the selected section increases to greater than about 100 millidarcy.

2194. The method of claim 2193, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

2195. The method of claim 2193, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

2196. The method of claim 2193, wherein the one or more heat sources comprise electrical heaters.

2197. The method of claim 2193, wherein the one or more heat sources comprise surface burners.

2198. The method of claim 2193, wherein the one or more heat sources comprise flameless distributed combustors.

2199. The method of claim 2193, wherein the one or more heat sources comprise natural distributed combustors.

2200. The method of claim 2193, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2201. The method of claim 2193, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

2202. The method of claim 2193, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2203. The method of claim 2193, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

2204. The method of claim 2193, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

2205. The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2206. The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2207. The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2208. The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2209. The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2210. The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and

wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2211. The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2212. The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2213. The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2214. The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2215. The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2216. The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises a non-condensable component,

wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2217. The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2218. The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2219. The method of claim 2193, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2220. The method of claim 2193, further comprising controlling formation conditions to produce a mixture from the formation, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2221. The method of claim 2220, further comprising producing a mixture from the formation, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2222. The method of claim 2193, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2223. The method of claim 2193, further comprising producing a mixture from the formation and controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2224. The method of claim 2193, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

2225. The method of claim 2193, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2226. The method of claim 2193, further comprising increasing a permeability of a majority of the selected section to greater than about 5 Darcy.

2227. The method of claim 2193, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

2228. The method of claim 2193, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2229. The method of claim 2193, further comprising producing a mixture in a production well, wherein at least about 7 heat sources are disposed in the formation for each production well.

2230. The method of claim 2193, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2231. The method of claim 2193, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat

sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2232. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation; and

allowing the heat to transfer from the one or more heat sources to a selected section of the formation such that a permeability of a majority of at least a portion of the selected section increases substantially uniformly.

2233. The method of claim 2232, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

2234. The method of claim 2232, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

2235. The method of claim 2232, wherein the one or more heat sources comprise electrical heaters.

2236. The method of claim 2232, wherein the one or more heat sources comprise surface burners.

2237. The method of claim 2232, wherein the one or more heat sources comprise flameless distributed combustors.

2238. The method of claim 2232, wherein the one or more heat sources comprise natural distributed combustors.

2239. The method of claim 2232, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2240. The method of claim 2232, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

2241. The method of claim 2232, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2242. The method of claim 2232, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

2243. The method of claim 2232, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

2244. The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2245. The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2246. The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2247. The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2248. The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2249. The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2250. The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2251. The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2252. The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2253. The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2254. The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2255. The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2256. The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2257. The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2258. The method of claim 2232, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2259. The method of claim 2232, further comprising controlling formation conditions to produce a mixture from the formation, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2260. The method of claim 2232, further comprising producing a mixture from the formation, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2261. The method of claim 2232, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2262. The method of claim 2232, further comprising producing a mixture from the formation and controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2263. The method of claim 2232, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

2264. The method of claim 2232, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2265. The method of claim 2232, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

2266. The method of claim 2232, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2267. The method of claim 2232, further comprising producing a mixture in a production well, wherein at least about 7 heat sources are disposed in the formation for each production well.

2268. The method of claim 2232, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2269. The method of claim 2232, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2270. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation; and

allowing the heat to transfer from the one or more heat sources to a selected section of the formation such that a porosity of a majority of at least a portion of the selected section increases substantially uniformly.

2271. The method of claim 2270, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

2272. The method of claim 2270, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

2273. The method of claim 2270, wherein the one or more heat sources comprise electrical heaters.

2274. The method of claim 2270, wherein the one or more heat sources comprise surface burners.

2275. The method of claim 2270, wherein the one or more heat sources comprise flameless distributed combustors.

2276. The method of claim 2270, wherein the one or more heat sources comprise natural distributed combustors.

2277. The method of claim 2270, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2278. The method of claim 2270, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

2279. The method of claim 2270, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2280. The method of claim 2270, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

2281. The method of claim 2270, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

2282. The method of claim 2270, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2283. The method of claim 2270, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2284. The method of claim 2270, further comprising producing a mixture from the formation, wherein the produced mixture comprises non-condensable hydrocarbons, and

wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2285. The method of claim 2270, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2286. The method of claim 2270, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2287. The method of claim 2270, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2288. The method of claim 2270, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2289. The method of claim 2270, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2290. The method of claim 2270, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and

wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2291. The method of claim 2270, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2292. The method of claim 2270, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2293. The method of claim 2270, further comprising producing a mixture from the formation, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2294. The method of claim 2270, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2295. The method of claim 2270, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2296. The method of claim 2270, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2297. The method of claim 2270, further comprising controlling formation conditions to produce a mixture from the formation, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2298. The method of claim 2193, further comprising producing a mixture from the formation, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2299. The method of claim 2193, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2300. The method of claim 2193, further comprising producing a mixture from the formation and controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2301. The method of claim 2270, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

2302. The method of claim 2270, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2303. The method of claim 2270, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

2304. The method of claim 2270, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

2305. The method of claim 2270, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2306. The method of claim 2270, further comprising producing a mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

2307. The method of claim 2270, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2308. The method of claim 2270, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2309. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation; and

controlling the heat to yield at least about 15 % by weight of a total organic carbon content of at least some of the coal formation into condensable hydrocarbons.

2310. The method of claim 2309, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat

sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

2311. The method of claim 2309, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

2312. The method of claim 2309, wherein the one or more heat sources comprise electrical heaters.

2313. The method of claim 2309, wherein the one or more heat sources comprise surface burners.

2314. The method of claim 2309, wherein the one or more heat sources comprise flameless distributed combustors.

2315. The method of claim 2309, wherein the one or more heat sources comprise natural distributed combustors.

2316. The method of claim 2309, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2317. The method of claim 2309, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

2318. The method of claim 2309, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2319. The method of claim 2309, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

2320. The method of claim 2309, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

2321. The method of claim 2309, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2322. The method of claim 2309, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2323. The method of claim 2309, further comprising producing a mixture from the formation, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2324. The method of claim 2309, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2325. The method of claim 2309, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2326. The method of claim 2309, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2327. The method of claim 2309, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2328. The method of claim 2309, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2329. The method of claim 2309, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2330. The method of claim 2309, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2331. The method of claim 2309, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2332. The method of claim 2309, further comprising producing a mixture from the formation, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2333. The method of claim 2309, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2334. The method of claim 2309, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2335. The method of claim 2309, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2336. The method of claim 2309, further comprising controlling formation conditions to produce a mixture from the formation, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2337. The method of claim 2309, further comprising producing a mixture from the formation, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2338. The method of claim 2309, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2339. The method of claim 2309, further comprising producing a mixture from the formation and controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2340. The method of claim 2309, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

2341. The method of claim 2309, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2342. The method of claim 2309, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

2343. The method of claim 2309, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

2344. The method of claim 2309, wherein the heating is controlled to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2345. The method of claim 2309, further comprising producing a mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

2346. The method of claim 2309, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2347. The method of claim 2309, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2348. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation; and

controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2349. The method of claim 2348, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

2350. The method of claim 2348, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

2351. The method of claim 2348, wherein the one or more heat sources comprise electrical heaters.

2352. The method of claim 2348, wherein the one or more heat sources comprise surface burners.

2353. The method of claim 2348, wherein the one or more heat sources comprise flameless distributed combustors.

2354. The method of claim 2348, wherein the one or more heat sources comprise natural distributed combustors.

2355. The method of claim 2348, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation. wherein the pressure is controlled as a function of temperature. or the temperature is controlled as a function of pressure.

2356. The method of claim 2348, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

2357. The method of claim 2348, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources. wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation: and

wherein heating energy/day provided to the volume is equal to or less than Pwr. wherein Pwr is calculated by the equation:

$Pwr = h*V*C_v*\rho_B$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2358. The method of claim 2348, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

2359. The method of claim 2348, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

2360. The method of claim 2348, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2361. The method of claim 2348, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2362. The method of claim 2348, further comprising producing a mixture from the formation, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2363. The method of claim 2348, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2364. The method of claim 2348, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2365. The method of claim 2348, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2366. The method of claim 2348, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2367. The method of claim 2348, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2368. The method of claim 2348, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2369. The method of claim 2348, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2370. The method of claim 2348, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2371. The method of claim 2348, further comprising producing a mixture from the formation, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2372. The method of claim 2348, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2373. The method of claim 2348, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2374. The method of claim 2348, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2375. The method of claim 2348, further comprising controlling formation conditions to produce a mixture from the formation, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2376. The method of claim 2348, further comprising producing a mixture from the formation, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2377. The method of claim 2348, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2378. The method of claim 2348, further comprising producing a mixture from the formation and controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2379. The method of claim 2348, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

2380. The method of claim 2348, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2381. The method of claim 2348, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

2382. The method of claim 2348, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

2383. The method of claim 2348, further comprising producing a mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

2384. The method of claim 2348, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat

sources are located in the formation in a unit of heat sources. and wherein the unit of heat sources comprises a triangular pattern.

2385. The method of claim 2348, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2386. A method of treating a coal formation in situ. comprising:

heating a first section of the formation to pyrolyze at least some hydrocarbons in the first section and produce a first mixture from the formation:

heating a second section of the formation to pyrolyze at least some hydrocarbons in the second section and produce a second mixture from the formation: and

leaving an unpyrolyzed section between the first section and the second section to inhibit subsidence of the formation.

2387. The method of claim 2386, further comprising maintaining a temperature within the first section or the second section within a pyrolysis temperature range.

2388. The method of claim 2386, wherein heating the first section or heating the second section comprises heating with an electrical heater.

2389. The method of claim 2386, wherein heating the first section or heating the second section comprises heating with a surface burner.

2390. The method of claim 2386. wherein heating the first section or heating the second section comprises heating with a flameless distributed combustor.

2391. The method of claim 2386, wherein heating the first section or heating the second section comprises heating with a natural distributed combustor.

2392. The method of claim 2386, further comprising controlling a pressure and a temperature within at least a majority of the first or second section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2393. The method of claim 2386, further comprising controlling the heat such that an average heating rate of the first or second section is less than about 1 °C per day during pyrolysis.

2394. The method of claim 2386, wherein heating the first section or heating the second section comprises:

heating a selected volume (V) of the coal formation from one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation: and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2395. The method of claim 2386, wherein heating the first section or heating the second section comprises transferring heat substantially by conduction.

2396. The method of claim 2386, wherein heating the first section or heating the second section comprises heating the formation such that a thermal conductivity of at least a portion of the first or second section, respectively, is greater than about 0.5 W/(m °C).

2397. The method of claim 2386, wherein the first or second mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2398. The method of claim 2386, wherein the first or second mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2399. The method of claim 2386, wherein the first or second mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2400. The method of claim 2386, wherein the first or second mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2401. The method of claim 2386, wherein the first or second mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2402. The method of claim 2386, wherein the first or second mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2403. The method of claim 2386, wherein the first or second mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2404. The method of claim 2386, wherein the first or second mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2405. The method of claim 2386, wherein the first or second mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2406. The method of claim 2386, wherein the first or second mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2407. The method of claim 2386, wherein the first or second mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2408. The method of claim 2386, wherein the first or second mixture comprises a non-condensable component, and wherein the non-condensable component comprises hydrogen, and wherein the hydrogen is greater than about 10 % by volume of the non-condensable component and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2409. The method of claim 2386, wherein the first or second mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the first or second mixture is ammonia.

2410. The method of claim 2386, wherein the first or second mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2411. The method of claim 2386, further comprising controlling a pressure within at least a majority of the first or second section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2412. The method of claim 2386, further comprising controlling formation conditions to produce the first or second mixture, wherein a partial pressure of H_2 within the first or second mixture is greater than about 0.5 bar.

2413. The method of claim 2386, wherein a partial pressure of H_2 within the first or second mixture is measured when the first or second mixture is at a production well.

2414. The method of claim 2386, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2415. The method of claim 2386, further comprising controlling formation conditions by recirculating a portion of hydrogen from the first or second mixture into the formation.

2416. The method of claim 2386, further comprising:

providing hydrogen (H_2) to the first or second section to hydrogenate hydrocarbons within the first or second section, respectively; and

heating a portion of the first or second section, respectively, with heat from hydrogenation.

2417. The method of claim 2386, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2418. The method of claim 2386, wherein heating the first section or heating the second section comprises increasing a permeability of a majority of the first or second section, respectively, to greater than about 100 millidarcy.

2419. The method of claim 2386, wherein heating the first section or heating the second section comprises substantially uniformly increasing a permeability of a majority of the first or second section, respectively.

2420. The method of claim 2386, further comprising controlling heating of the first or second section to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay, from the first or second section, respectively.

2421. The method of claim 2386, wherein producing the first or second mixture comprises producing the first or second mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

2422. The method of claim 2386, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2423. The method of claim 2386, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2424. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation; and

producing a mixture from the formation through one or more production wells, wherein the heating is controlled such that the mixture can be produced from the

formation as a vapor, and wherein at least about 7 heat sources are disposed in the formation for each production well.

2425. The method of claim 2424, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

2426. The method of claim 2424, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

2427. The method of claim 2424, wherein the one or more heat sources comprise electrical heaters.

2428. The method of claim 2424, wherein the one or more heat sources comprise surface burners.

2429. The method of claim 2424, wherein the one or more heat sources comprise flameless distributed combustors.

2430. The method of claim 2424, wherein the one or more heat sources comprise natural distributed combustors.

2431. The method of claim 2424, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2432. The method of claim 2424, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

2433. The method of claim 2424, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2434. The method of claim 2424, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

2435. The method of claim 2424, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

2436. The method of claim 2424, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2437. The method of claim 2424, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2438. The method of claim 2424, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2439. The method of claim 2424, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2440. The method of claim 2424, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2441. The method of claim 2424, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2442. The method of claim 2424, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2443. The method of claim 2424, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2444. The method of claim 2424, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2445. The method of claim 2424, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2446. The method of claim 2424, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2447. The method of claim 2424, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2448. The method of claim 2424, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2449. The method of claim 2424, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2450. The method of claim 2424, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2451. The method of claim 2424, further comprising controlling formation conditions to produce the mixture; wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2452. The method of claim 2452, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2453. The method of claim 2424, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2454. The method of claim 2424, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2455. The method of claim 2424, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

2456. The method of claim 2424, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2457. The method of claim 2424, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

2458. The method of claim 2424, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

2459. The method of claim 2424, wherein the heating is controlled to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2460. The method of claim 2424, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2461. The method of claim 2424, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat

sources comprises a triangular pattern. and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2462. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation. wherein the one or more heat sources are disposed within one or more first wells;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation; and

producing a mixture from the formation through one or more second wells. wherein one or more of the first or second wells are initially used for a first purpose and are then used for one or more other purposes.

2463. The method of claim 2462. wherein the first purpose comprises removing water from the formation. and wherein the second purpose comprises providing heat to the formation.

2464. The method of claim 2462. wherein the first purpose comprises removing water from the formation, and wherein the second purpose comprises producing the mixture.

2465. The method of claim 2462, wherein the first purpose comprises heating, and wherein the second purpose comprises removing water from the formation.

2466. The method of claim 2462, wherein the first purpose comprises producing the mixture, and wherein the second purpose comprises removing water from the formation.

2467. The method of claim 2462, wherein the one or more heat sources comprise electrical heaters.

2468. The method of claim 2462, wherein the one or more heat sources comprise surface burners.

2469. The method of claim 2462, wherein the one or more heat sources comprise flameless distributed combustors.

2470. The method of claim 2462, wherein the one or more heat sources comprise natural distributed combustors.

2471. The method of claim 2462, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2472. The method of claim 2462, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1.0 ° C per day during pyrolysis.

2473. The method of claim 2462, wherein providing heat from the one or more heat sources to at least the portion of the formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2474. The method of claim 2462, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

2475. The method of claim 2462, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2476. The method of claim 2462, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2477. The method of claim 2462, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2478. The method of claim 2462, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2479. The method of claim 2462, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2480. The method of claim 2462, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2481. The method of claim 2462, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2482. The method of claim 2462, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2483. The method of claim 2462, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2484. The method of claim 2462, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2485. The method of claim 2462, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2486. The method of claim 2462, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2487. The method of claim 2462, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2488. The method of claim 2462, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2489. The method of claim 2462, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2490. The method of claim 2462, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2491. The method of claim 2490, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

2492. The method of claim 2462, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2493. The method of claim 2462, further comprising controlling formation conditions, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

2494. The method of claim 2462, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

2495. The method of claim 2462, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2496. The method of claim 2462, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

2497. The method of claim 2462, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

2498. The method of claim 2462, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2499. The method of claim 2462, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

2500. The method of claim 2462, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2501. The method of claim 2462, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2502. A method for forming heater wells in a coal formation, comprising:

forming a first wellbore in the formation;

forming a second wellbore in the formation using magnetic tracking such that the second wellbore is arranged substantially parallel to the first wellbore; and

providing at least one heating mechanism within the first wellbore and at least one heating mechanism within the second wellbore such that the heating mechanisms can provide heat to at least a portion of the formation.

2503. The method of claim 2502, wherein superposition of heat from the at least one heating mechanism within the first wellbore and the at least one heating mechanism within the second wellbore pyrolyzes at least some hydrocarbons within a selected section of the formation.

2504. The method of claim 2502, further comprising maintaining a temperature within a selected section within a pyrolysis temperature range.

2505. The method of claim 2502, wherein the heating mechanisms comprise electrical heaters.

2506. The method of claim 2502, wherein the heating mechanisms comprise surface burners.

2507. The method of claim 2502, wherein the heating mechanisms comprise flameless distributed combustors.

2508. The method of claim 2502, wherein the heating mechanisms comprise natural distributed combustors.

2509. The method of claim 2502, further comprising controlling a pressure and a temperature within at least a majority of a selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2510. The method of claim 2502, further comprising controlling the heat from the heating mechanisms such that heat transferred from the heating mechanisms to at least the portion of the hydrocarbons is less than about 1 °C per day during pyrolysis.

2511. The method of claim 2502, further comprising:

heating a selected volume (V) of the coal formation from the heating mechanisms, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2512. The method of claim 2502, further comprising allowing the heat to transfer from the heating mechanisms to at least the portion of the formation substantially by conduction.

2513. The method of claim 2502, further comprising providing heat from the heating mechanisms to at least the portion of the formation such that a thermal conductivity of at least the portion of the formation is greater than about 0.5 W/(m °C).

2514. The method of claim 2502, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2515. The method of claim 2502, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2516. The method of claim 2502, further comprising producing a mixture from the formation, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2517. The method of claim 2502, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2518. The method of claim 2502, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2519. The method of claim 2502, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2520. The method of claim 2502, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2521. The method of claim 2502, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2522. The method of claim 2502, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2523. The method of claim 2502, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2524. The method of claim 2502, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2525. The method of claim 2502, further comprising producing a mixture from the formation, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2526. The method of claim 2502, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2527. The method of claim 2502, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2528. The method of claim 2502, further comprising controlling a pressure within at least a majority of a selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2529. The method of claim 2528, wherein the partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2530. The method of claim 2502, further comprising producing a mixture from the formation, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2531. The method of claim 2502, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2532. The method of claim 2502, further comprising producing a mixture from the formation and controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2533. The method of claim 2502, further comprising:

providing hydrogen (H_2) to the portion to hydrogenate hydrocarbons within the formation; and

heating a portion of the formation with heat from hydrogenation.

2534. The method of claim 2502, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2535. The method of claim 2502, further comprising allowing heat to transfer from the heating mechanisms to a selected section of the formation to pyrolyze at least some hydrocarbons within the selected section such that a permeability of a majority of a selected section of the formation increases to greater than about 100 millidarcy.

2536. The method of claim 2502, further comprising allowing heat to transfer from the heating mechanisms to a selected section of the formation to pyrolyze at least some hydrocarbons within the selected section such that a permeability of a majority of the selected section increases substantially uniformly.

2537. The method of claim 2502, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2538. The method of claim 2502, further comprising producing a mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

2539. The method of claim 2502, further comprising forming a production well in the formation using magnetic tracking such that the production well is substantially parallel to the first wellbore and coupling a wellhead to the third wellbore.

2540. The method of claim 2502, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2541. The method of claim 2502, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2542. A method for installing a heater well into a coal formation, comprising:

forming a bore in the ground using a steerable motor and an accelerometer; and

providing a heating mechanism within the bore such that the heating mechanism can transfer heat to at least a portion of the formation.

2543. The method of claim 2542, further comprising installing at least two heater wells, and wherein superposition of heat from at least the two heater wells pyrolyzes at least some hydrocarbons within a selected section of the formation.

2544. The method of claim 2542, further comprising maintaining a temperature within a selected section within a pyrolysis temperature range.

2545. The method of claim 2542, wherein the heating mechanism comprises an electrical heater.

2546. The method of claim 2542, wherein the heating mechanism comprises a surface burner.

2547. The method of claim 2542, wherein the heating mechanism comprises a flameless distributed combustor.

2548. The method of claim 2542, wherein the heating mechanism comprises a natural distributed combustor.

2549. The method of claim 2542, further comprising controlling a pressure and a temperature within at least a majority of a selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2550. The method of claim 2542, further comprising controlling the heat from the heating mechanism such that heat transferred from the heating mechanism to at least the portion of the formation is less than about 1 °C per day during pyrolysis.

2551. The method of claim 2542, further comprising:

heating a selected volume (V) of the coal formation from the heating mechanism, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2552. The method of claim 2542, further comprising allowing the heat to transfer from the heating mechanism to at least the portion of the formation substantially by conduction.

2553. The method of claim 2542, further comprising providing heat from the heating mechanism to at least the portion of the formation such that a thermal conductivity of at least the portion of the formation is greater than about 0.5 W/(m °C).

2554. The method of claim 2542, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2555. The method of claim 2542, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2556. The method of claim 2542, further comprising producing a mixture from the formation, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2557. The method of claim 2542, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2558. The method of claim 2542, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and

wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2559. The method of claim 2542, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2560. The method of claim 2542, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2561. The method of claim 2542, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2562. The method of claim 2542, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2563. The method of claim 2542, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2564. The method of claim 2542, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and

wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2565. The method of claim 2542, further comprising producing a mixture from the formation, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2566. The method of claim 2542, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2567. The method of claim 2542, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2568. The method of claim 2542, further comprising controlling a pressure within at least a majority of a selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2569. The method of claim 2542, further comprising controlling formation conditions to produce a mixture from the formation, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2570. The method of claim 2569, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2571. The method of claim 2542, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2572. The method of claim 2542, further comprising producing a mixture from the formation and controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2573. The method of claim 2542, further comprising:

providing hydrogen (H_2) to the at least the heated portion to hydrogenate hydrocarbons within the formation; and

heating a portion of the formation with heat from hydrogenation.

2574. The method of claim 2542, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2575. The method of claim 2542, further comprising allowing heat to transfer from the heating mechanism to a selected section of the formation to pyrolyze at least some hydrocarbons within the selected section such that a permeability of a majority of a selected section of the formation increases to greater than about 100 millidarcy.

2576. The method of claim 2542, further comprising allowing heat to transfer from the heating mechanism to a selected section of the formation to pyrolyze at least some hydrocarbons within the selected section such that a permeability of a majority of the selected section increases substantially uniformly.

2577. The method of claim 2542, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2578. The method of claim 2542, further comprising producing a mixture in a production well, and wherein at least about 7 heating mechanisms are disposed in the formation for each production well.

2579. The method of claim 2542, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2580. The method of claim 2542, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2581. A method for installing of wells in a coal formation, comprising:

forming a wellbore in the formation by geosteered drilling; and

providing a heating mechanism within the wellbore such that the heating mechanism can transfer heat to at least a portion of the formation.

2582. The method of claim 2581, further comprising maintaining a temperature within a selected section within a pyrolysis temperature range.

2583. The method of claim 2581, wherein the heating mechanism comprises an electrical heater.

2584. The method of claim 2581, wherein the heating mechanism comprises a surface burner.

2585. The method of claim 2581, wherein the heating mechanism comprises a flameless distributed combustor.

2586. The method of claim 2581, wherein the heating mechanism comprises a natural distributed combustor.

2587. The method of claim 2581, further comprising controlling a pressure and a temperature within at least a majority of a selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2588. The method of claim 2581, further comprising controlling the heat from the heating mechanism such that heat transferred from the heating mechanism to at least the portion of the formation is less than about 1 °C per day during pyrolysis.

2589. The method of claim 2581, further comprising:

heating a selected volume (V) of the coal formation from the heating mechanism, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h^*V^*C_v{}^*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2590. The method of claim 2581, further comprising allowing the heat to transfer from the heating mechanism to at least the portion of the formation substantially by conduction.

2591. The method of claim 2581, further comprising providing heat from the heating mechanism to at least the portion of the formation such that a thermal conductivity of at least the portion of the formation is greater than about 0.5 W/(m °C).

2592. The method of claim 2581, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2593. The method of claim 2581, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2594. The method of claim 2581, further comprising producing a mixture from the formation, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2595. The method of claim 2581, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2596. The method of claim 2581, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2597. The method of claim 2581, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2598. The method of claim 2581, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, wherein

about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2599. The method of claim 2581, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2600. The method of claim 2581, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2601. The method of claim 2581, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2602. The method of claim 2581, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2603. The method of claim 2581, further comprising producing a mixture from the formation, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2604. The method of claim 2581, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2605. The method of claim 2581, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2606. The method of claim 2581, further comprising controlling a pressure within at least a majority of a selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2607. The method of claim 2581, further comprising controlling formation conditions to produce a mixture from the formation, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2608. The method of claim 2607, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2609. The method of claim 2581, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2610. The method of claim 2581, further comprising producing a mixture from the formation and controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2611. The method of claim 2581, further comprising:

providing hydrogen (H_2) to at least the heated portion to hydrogenate hydrocarbons within the formation; and

heating a portion of the formation with heat from hydrogenation.

2612. The method of claim 2581, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2613. The method of claim 2581, further comprising allowing heat to transfer from the heating mechanism to a selected section of the formation to pyrolyze at least some hydrocarbons within the selected section such that a permeability of a majority of a selected section of the formation increases to greater than about 100 millidarcy.

2614. The method of claim 2581, further comprising allowing heat to transfer from the heating mechanism to a selected section of the formation to pyrolyze at least some hydrocarbons within the selected section such that a permeability of a majority of the selected section increases substantially uniformly.

2615. The method of claim 2581, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2616. The method of claim 2581, further comprising producing a mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

2617. The method of claim 2581, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2618. The method of claim 2581, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat

sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2619. A method of treating a coal formation in situ, comprising:

heating a selected section of the formation with a heating element placed within a wellbore, wherein at least one end of the heating element is free to move axially within the wellbore to allow for thermal expansion of the heating element.

2620. The method of claim 2619, further comprising at least two heating elements within at least two wellbores, and wherein superposition of heat from at least the two heating elements pyrolyzes at least some hydrocarbons within a selected section of the formation.

2621. The method of claim 2619, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

2622. The method of claim 2619, wherein the heating element comprises a pipe-in-pipe heater.

2623. The method of claim 2619, wherein the heating element comprises a flameless distributed combustor.

2624. The method of claim 2619, wherein the heating element comprises a mineral insulated cable coupled to a support, and wherein the support is free to move within the wellbore.

2625. The method of claim 2619, wherein the heating element comprises a mineral insulated cable suspended from a wellhead.

2626. The method of claim 2619, further comprising controlling a pressure and a temperature within at least a majority of a heated section of the formation, wherein the

pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2627. The method of claim 2619, further comprising controlling the heat such that an average heating rate of the heated section is less than about 1 °C per day during pyrolysis.

2628. The method of claim 2619, wherein heating the section of the formation further comprises:

heating a selected volume (V) of the coal formation from the heating element, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2629. The method of claim 2619, wherein heating the section of the formation comprises transferring heat substantially by conduction.

2630. The method of claim 2619, further comprising heating the selected section of the formation such that a thermal conductivity of the selected section is greater than about 0.5 W/(m °C).

2631. The method of claim 2619, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2632. The method of claim 2619, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and

wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2633. The method of claim 2619, further comprising producing a mixture from the formation, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2634. The method of claim 2619, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons. and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2635. The method of claim 2619, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons. and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2636. The method of claim 2619, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2637. The method of claim 2619, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2638. The method of claim 2619, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons. and

wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2639. The method of claim 2619, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2640. The method of claim 2619, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2641. The method of claim 2619, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2642. The method of claim 2619, further comprising producing a mixture from the formation, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2643. The method of claim 2619, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2644. The method of claim 2619, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2645. The method of claim 2619, further comprising controlling a pressure within the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2646. The method of claim 2619, further comprising controlling formation conditions to produce a mixture from the formation, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2647. The method of claim 2647, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2648. The method of claim 2619, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2649. The method of claim 2619, further comprising producing a mixture from the formation and controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2650. The method of claim 2619, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the heated section; and

heating a portion of the section with heat from hydrogenation.

2651. The method of claim 2619, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2652. The method of claim 2619, wherein heating comprises increasing a permeability of a majority of the heated section to greater than about 100 millidarcy.

2653. The method of claim 2619, wherein heating comprises substantially uniformly increasing a permeability of a majority of the heated section.

2654. The method of claim 2619, wherein the heating is controlled to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2655. The method of claim 2619, further comprising producing a mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

2656. The method of claim 2619, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2657. The method of claim 2619, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2658. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation; and

producing a mixture from the formation through a production well, wherein the production well is located such that a majority of the mixture produced from the

formation comprises non-condensable hydrocarbons and a non-condensable component comprising hydrogen.

2659. The method of claim 2658, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

2660. The method of claim 2658, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

2661. The method of claim 2658, wherein the production well is less than approximately 6 m from a heat source of the one or more heat sources.

2662. The method of claim 2658, wherein the production well is less than approximately 3 m from a heat source of the one or more heat sources.

2663. The method of claim 2658, wherein the production well is less than approximately 1.5 m from a heat source of the one or more heat sources.

2664. The method of claim 2658, wherein an additional heat source is positioned within a wellbore of the production well.

2665. The method of claim 2658, wherein the one or more heat sources comprise electrical heaters.

2666. The method of claim 2658, wherein the one or more heat sources comprise surface burners.

2667. The method of claim 2658, wherein the one or more heat sources comprise flameless distributed combustors.

2668. The method of claim 2658, wherein the one or more heat sources comprise natural distributed combustors.

2669. The method of claim 2658, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2670. The method of claim 2658, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

2671. The method of claim 2658, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2672. The method of claim 2658, wherein allowing the heat to transfer from the one or more heat sources to the selected section comprises transferring heat substantially by conduction.

2673. The method of claim 2658, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

2674. The method of claim 2658, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2675. The method of claim 2658, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2676. The method of claim 2658, wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2677. The method of claim 2658, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2678. The method of claim 2658, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2679. The method of claim 2658, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2680. The method of claim 2658, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2681. The method of claim 2658, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2682. The method of claim 2658, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2683. The method of claim 2658, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2684. The method of claim 2658, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2685. The method of claim 2658, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2686. The method of claim 2658, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2687. The method of claim 2658, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2688. The method of claim 2658, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2689. The method of claim 2658, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2690. The method of claim 2689, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2691. The method of claim 2658, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2692. The method of claim 2658, further comprising controlling formation conditions by recirculating a portion of the hydrogen from the mixture into the formation.

2693. The method of claim 2658, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

2694. The method of claim 2658, further comprising:

producing condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2695. The method of claim 2658, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

2696. The method of claim 2658, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

2697. The method of claim 2658, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2698. The method of claim 2658, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

2699. The method of claim 2658, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2700. The method of claim 2658, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2701. A method of treating a coal formation in situ, comprising:

providing heat to at least a portion of the formation from one or more first heat sources placed within a pattern in the formation;

allowing the heat to transfer from the one or more first heat sources to a first section of the formation;

heating a second section of the formation with at least one second heat source, wherein the second section is located within the first section, and wherein at least the one second heat source is configured to raise an average temperature of a portion of the second section to a higher temperature than an average temperature of the first section; and

producing a mixture from the formation through a production well positioned within the second section, wherein a majority of the produced mixture comprises non-

condensable hydrocarbons and a non-condensable component comprising H_2 components.

2702. The method of claim 2701, wherein the one or more first heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the first section of the formation.

2703. The method of claim 2701, further comprising maintaining a temperature within the first section within a pyrolysis temperature range.

2704. The method of claim 2701, wherein at least the one heat source comprises a heater element positioned within the production well.

2705. The method of claim 2701, wherein at least the one second heat source comprises an electrical heater.

2706. The method of claim 2701, wherein at least the one second heat source comprises a surface burner.

2707. The method of claim 2701, wherein at least the one second heat source comprises a flameless distributed combustor.

2708. The method of claim 2701, wherein at least the one second heat source comprises a natural distributed combustor.

2709. The method of claim 2701, further comprising controlling a pressure and a temperature within at least a majority of the first or the second section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2710. The method of claim 2701, further comprising controlling the heat such that an average heating rate of the first section is less than about 1 °C per day during pyrolysis.

2711. The method of claim 2701, wherein providing heat to the formation further comprises:

heating a selected volume (V) of the from the one or more first heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2712. The method of claim 2701, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

2713. The method of claim 2701, wherein providing heat from the one or more first heat sources comprises heating the first section such that a thermal conductivity of at least a portion of the first section is greater than about 0.5 W/(m °C).

2714. The method of claim 2701, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2715. The method of claim 2701, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2716. The method of claim 2701, wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2717. The method of claim 2701, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2718. The method of claim 2701, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2719. The method of claim 2701, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2720. The method of claim 2701, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2721. The method of claim 2701, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2722. The method of claim 2701, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2723. The method of claim 2701, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2724. The method of claim 2701, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2725. The method of claim 2701, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2726. The method of claim 2701, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2727. The method of claim 2701, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2728. The method of claim 2701, further comprising controlling a pressure within at least a majority of the first or the second section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2729. The method of claim 2701, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2730. The method of claim 2729, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2731. The method of claim 2701, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2732. The method of claim 2701, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2733. The method of claim 2701, further comprising:

providing hydrogen (H_2) to the first or second section to hydrogenate hydrocarbons within the first or second section, respectively; and

heating a portion of the first or second section, respectively, with heat from hydrogenation.

2734. The method of claim 2701, further comprising:

producing condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2735. The method of claim 2701, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the first or second section to greater than about 100 millidarcy.

2736. The method of claim 2701, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the first or second section.

2737. The method of claim 2701, wherein heating the first or the second section is controlled to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2738. The method of claim 2701, wherein at least about 7 heat sources are disposed in the formation for each production well.

2739. The method of claim 2701, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat

sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2740. The method of claim 2701, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2741. A method of treating a coal formation in situ, comprising:

providing heat into the formation from a plurality of heat sources placed in a pattern within the formation, wherein a spacing between heat sources is greater than about 6 m;

allowing the heat to transfer from the plurality of heat sources to a selected section of the formation;

producing a mixture from the formation from a plurality of production wells, wherein the plurality of production wells are positioned within the pattern, and wherein a spacing between production wells is greater than about 12 m.

2742. The method of claim 2741, wherein superposition of heat from the plurality of heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

2743. The method of claim 2741, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

2744. The method of claim 2741, wherein the plurality of heat sources comprises electrical heaters.

2745. The method of claim 2741, wherein the plurality of heat sources comprises surface burners.

2746. The method of claim 2741, wherein the plurality of heat sources comprises flameless distributed combustors.

2747. The method of claim 2741, wherein the plurality of heat sources comprises natural distributed combustors.

2748. The method of claim 2741, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2749. The method of claim 2741, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

2750. The method of claim 2741, wherein providing heat from the plurality of heat comprises:

heating a selected volume (V) of the coal formation from the plurality of heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

2751. The method of claim 2741, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

2752. The method of claim 2741, wherein providing heat comprises heating the selected formation such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

2753. The method of claim 2741, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2754. The method of claim 2741, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2755. The method of claim 2741, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2756. The method of claim 2741, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2757. The method of claim 2741, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2758. The method of claim 2741, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2759. The method of claim 2741, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2760. The method of claim 2741, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2761. The method of claim 2741, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2762. The method of claim 2741, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2763. The method of claim 2741, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2764. The method of claim 2741, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

2765. The method of claim 2741, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2766. The method of claim 2741, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2767. The method of claim 2741, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2768. The method of claim 2741, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

2769. The method of claim 2768, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

2770. The method of claim 2741, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2771. The method of claim 2741, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2772. The method of claim 2741, further comprising:

providing hydrogen (H_2) to the selected section to hydrogenate hydrocarbons within the selected section; and

heating a portion of the selected section with heat from hydrogenation.

2773. The method of claim 2741, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2774. The method of claim 2741, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

2775. The method of claim 2741, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

2776. The method of claim 2741, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2777. The method of claim 2741, wherein at least about 7 heat sources are disposed in the formation for each production well.

2778. The method of claim 2741, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

2779. The method of claim 2741, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2780. A system configured to heat a coal formation, comprising:

a heater disposed in an opening in the formation, wherein the heater is configured to provide heat to at least a portion of the formation during use;

an oxidizing fluid source;

a conduit disposed in the opening, wherein the conduit is configured to provide an oxidizing fluid from the oxidizing fluid source to a reaction zone in the formation during use, and wherein the oxidizing fluid is selected to oxidize at least some hydrocarbons at the reaction zone during use such that heat is generated at the reaction zone; and

wherein the system is configured to allow heat to transfer substantially by conduction from the reaction zone to a pyrolysis zone of the formation during use.

2781. The system of claim 2780, wherein the oxidizing fluid is configured to generate heat in the reaction zone such that the oxidizing fluid is transported through the reaction zone substantially by diffusion.

2782. The system of claim 2780, wherein the conduit comprises orifices, and wherein the orifices are configured to provide the oxidizing fluid into the opening.

2783. The system of claim 2780, wherein the conduit comprises critical flow orifices, and wherein the critical flow orifices are configured to control a flow of the oxidizing fluid such that a rate of oxidation in the formation is controlled.

2784. The system of claim 2780, wherein the conduit is further configured to be cooled with the oxidizing fluid such that the conduit is not substantially heated by oxidation.

2785. The system of claim 2780, wherein the conduit is further configured to remove an oxidation product.

2786. The system of claim 2780, wherein the conduit is further configured to remove an oxidation product such that the oxidation product transfers substantial heat to the oxidizing fluid.

2787. The system of claim 2780, wherein the conduit is further configured to remove an oxidation product, and wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

2788. The system of claim 2780, wherein the conduit is further configured to remove an oxidation product, and wherein a pressure of the oxidizing fluid in the conduit and a pressure of the oxidation product in the conduit are controlled to reduce contamination of the oxidation product by the oxidizing fluid.

2789. The system of claim 2780, wherein the conduit is further configured to remove an oxidation product, and wherein the oxidation product is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

2790. The system of claim 2780, wherein the oxidizing fluid is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

2791. The system of claim 2780, further comprising a center conduit disposed within the conduit, wherein the center conduit is configured to provide the oxidizing fluid into the opening during use, and wherein the conduit is further configured to remove an oxidation product during use.

2792. The system of claim 2780, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

2793. The system of claim 2780, further comprising a conductor disposed in a second conduit, wherein the second conduit is disposed within the opening, and wherein the conductor is configured to heat at least a portion of the formation during application of an electrical current to the conductor.

2794. The system of claim 2780, further comprising an insulated conductor disposed within the opening, wherein the insulated conductor is configured to heat at least a portion of the formation during application of an electrical current to the insulated conductor.

2795. The system of claim 2780, further comprising at least one elongated member disposed within the opening, wherein the at least the one elongated member is configured to heat at least a portion of the formation during application of an electrical current to the at least the one elongated member.

2796. The system of claim 2780, further comprising a heat exchanger disposed external to the formation, wherein the heat exchanger is configured to heat the oxidizing fluid, wherein the conduit is further configured to provide the heated oxidizing fluid into the opening during use, and wherein the heated oxidizing fluid is configured to heat at least a portion of the formation during use.

2797. The system of claim 2780, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

2798. The system of claim 2780, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

2799. The system of claim 2780, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

2800. The system of claim 2780, further comprising an overburden casing coupled to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

2801. The system of claim 2780, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is configured to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

2802. The system of claim 2780, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the

formation. wherein a packing material is disposed at a junction of the overburden casing and the opening. and wherein the packing material comprises cement.

2803. The system of claim 2780, wherein the system is further configured such that transferred heat can pyrolyze at least some hydrocarbons in the pyrolysis zone.

2804. A system configurable to heat a coal formation, comprising:

a heater configurable to be disposed in an opening in the formation, wherein the heater is further configurable to provide heat to at least a portion of the formation during use;

a conduit configurable to be disposed in the opening, wherein the conduit is configurable to provide an oxidizing fluid from an oxidizing fluid source to a reaction zone in the formation during use, and wherein the system is configurable to allow the oxidizing fluid to oxidize at least some hydrocarbons at the reaction zone during use such that heat is generated at the reaction zone; and

wherein the system is further configurable to allow heat to transfer substantially by conduction from the reaction zone to a pyrolysis zone of the formation during use.

2805. The system of claim 2804, wherein the oxidizing fluid is configurable to generate heat in the reaction zone such that the oxidizing fluid is transported through the reaction zone substantially by diffusion.

2806. The system of claim 2804, wherein the conduit comprises orifices, and wherein the orifices are configurable to provide the oxidizing fluid into the opening.

2807. The system of claim 2804, wherein the conduit comprises critical flow orifices. and wherein the critical flow orifices are configurable to control a flow of the oxidizing fluid such that a rate of oxidation in the formation is controlled.

2808. The system of claim 2804, wherein the conduit is further configurable to be cooled with the oxidizing fluid such that the conduit is not substantially heated by oxidation.

2809. The system of claim 2804, wherein the conduit is further configurable to remove an oxidation product.

2810. The system of claim 2804, wherein the conduit is further configurable to remove an oxidation product, such that the oxidation product transfers heat to the oxidizing fluid.

2811. The system of claim 2804, wherein the conduit is further configurable to remove an oxidation product, and wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

2812. The system of claim 2804, wherein the conduit is further configurable to remove an oxidation product, and wherein a pressure of the oxidizing fluid in the conduit and a pressure of the oxidation product in the conduit are controlled to reduce contamination of the oxidation product by the oxidizing fluid.

2813. The system of claim 2804, wherein the conduit is further configurable to remove an oxidation product, and wherein the oxidation product is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

2814. The system of claim 2804, wherein the oxidizing fluid is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

2815. The system of claim 2804, further comprising a center conduit disposed within the conduit, wherein center conduit is configurable to provide the oxidizing fluid into the opening during use, and wherein the conduit is further configurable to remove an oxidation product during use.

2816. The system of claim 2804, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

2817. The system of claim 2804, further comprising a conductor disposed in a second conduit, wherein the second conduit is disposed within the opening, and wherein the conductor is configurable to heat at least a portion of the formation during application of an electrical current to the conductor.

2818. The system of claim 2804, further comprising an insulated conductor disposed within the opening, wherein the insulated conductor is configurable to heat at least a portion of the formation during application of an electrical current to the insulated conductor.

2819. The system of claim 2804, further comprising at least one elongated member disposed within the opening, wherein the at least the one elongated member is configurable to heat at least a portion of the formation during application of an electrical current to the at least the one elongated member.

2820. The system of claim 2804, further comprising a heat exchanger disposed external to the formation, wherein the heat exchanger is configurable to heat the oxidizing fluid, wherein the conduit is further configurable to provide the heated oxidizing fluid into the opening during use, and wherein the heated oxidizing fluid is configurable to heat at least a portion of the formation during use.

2821. The system of claim 2804, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

2822. The system of claim 2804, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

2823. The system of claim 2804, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

2824. The system of claim 2804, further comprising an overburden casing coupled to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

2825. The system of claim 2804, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is configurable to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

2826. The system of claim 2804, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

2827. The system of claim 2804, wherein the system is further configurable such that transferred heat can pyrolyze at least some hydrocarbons in the pyrolysis zone.

2828. An in situ method for heating a coal formation, comprising:

heating a portion of the formation to a temperature sufficient to support reaction of hydrocarbons within the portion of the formation with an oxidizing fluid;

providing the oxidizing fluid to a reaction zone in the formation;

allowing the oxidizing fluid to react with at least a portion of the hydrocarbons at the reaction zone to generate heat at the reaction zone; and

transferring the generated heat substantially by conduction from the reaction zone to a pyrolysis zone in the formation.

2829. The method of claim 2828, further comprising transporting the oxidizing fluid through the reaction zone by diffusion.

2830. The method of claim 2828, further comprising directing at least a portion of the oxidizing fluid into the opening through orifices of a conduit disposed in the opening.

2831. The method of claim 2828, further comprising controlling a flow of the oxidizing fluid with critical flow orifices of a conduit disposed in the opening such that a rate of oxidation is controlled.

2832. The method of claim 2828, further comprising increasing a flow of the oxidizing fluid in the opening to accommodate an increase in a volume of the reaction zone such that a rate of oxidation is substantially constant over time within the reaction zone.

2833. The method of claim 2828, wherein a conduit is disposed in the opening, the method further comprising cooling the conduit with the oxidizing fluid to reduce heating of the conduit by oxidation.

2834. The method of claim 2828, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit.

2835. The method of claim 2828, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit and transferring heat from the oxidation product in the conduit to oxidizing fluid in the conduit.

2836. The method of claim 2828, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through

the conduit, wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

2837. The method of claim 2828, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit and controlling a pressure between the oxidizing fluid and the oxidation product in the conduit to reduce contamination of the oxidation product by the oxidizing fluid.

2838. The method of claim 2828, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit and substantially inhibiting the oxidation product from flowing into portions of the formation beyond the reaction zone.

2839. The method of claim 2828, further comprising substantially inhibiting the oxidizing fluid from flowing into portions of the formation beyond the reaction zone.

2840. The method of claim 2828, wherein a center conduit is disposed within an outer conduit, and wherein the outer conduit is disposed within the opening, the method further comprising providing the oxidizing fluid into the opening through the center conduit and removing an oxidation product through the outer conduit.

2841. The method of claim 2828, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

2842. The method of claim 2828, wherein heating the portion comprises applying electrical current to a conductor disposed in a conduit, wherein the conduit is disposed within the opening.

2843. The method of claim 2828, wherein heating the portion comprises applying electrical current to an insulated conductor disposed within the opening.

2844. The method of claim 2828, wherein heating the portion comprises applying electrical current to at least one elongated member disposed within the opening.

2845. The method of claim 2828, wherein heating the portion comprises heating the oxidizing fluid in a heat exchanger disposed external to the formation such that providing the oxidizing fluid into the opening comprises transferring heat from the heated oxidizing fluid to the portion.

2846. The method of claim 2828, further comprising removing water from the formation prior to heating the portion.

2847. The method of claim 2828, further comprising controlling the temperature of the formation to substantially inhibit production of oxides of nitrogen during oxidation.

2848. The method of claim 2828, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation.

2849. The method of claim 2828, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

2850. The method of claim 2828, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

2851. The method of claim 2828, further comprising coupling an overburden casing to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

2852. The method of claim 2828, wherein the pyrolysis zone is substantially adjacent to the reaction zone.

2853. A system configured to heat a coal formation, comprising:

a heater disposed in an opening in the formation, wherein the heater is configured to provide heat to at least a portion of the formation during use;

an oxidizing fluid source;

a conduit disposed in the opening, wherein the conduit is configured to provide an oxidizing fluid from the oxidizing fluid source to a reaction zone in the formation during use, wherein the oxidizing fluid is selected to oxidize at least some hydrocarbons at the reaction zone during use such that heat is generated at the reaction zone, and wherein the conduit is further configured to remove an oxidation product from the formation during use; and

wherein the system is configured to allow heat to transfer substantially by conduction from the reaction zone to a pyrolysis zone of the formation during use.

2854. The system of claim 2853, wherein the oxidizing fluid is configured to generate heat in the reaction zone such that the oxidizing fluid is transported through the reaction zone substantially by diffusion.

2855. The system of claim 2853, wherein the conduit comprises orifices, and wherein the orifices are configured to provide the oxidizing fluid into the opening.

2856. The system of claim 2853, wherein the conduit comprises critical flow orifices, and wherein the critical flow orifices are configured to control a flow of the oxidizing fluid such that a rate of oxidation in the formation is controlled.

2857. The system of claim 2853, wherein the conduit is further configured to be cooled with the oxidizing fluid such that the conduit is not substantially heated by oxidation.

2858. The system of claim 2853, wherein the conduit is further configured such that the oxidation product transfers heat to the oxidizing fluid.

2859. The system of claim 2853, wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

2860. The system of claim 2853, wherein a pressure of the oxidizing fluid in the conduit and a pressure of the oxidation product in the conduit are controlled to reduce contamination of the oxidation product by the oxidizing fluid.

2861. The system of claim 2853, wherein the oxidation product is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

2862. The system of claim 2853, wherein the oxidizing fluid is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

2863. The system of claim 2853, further comprising a center conduit disposed within the conduit, wherein the center conduit is configured to provide the oxidizing fluid into the opening during use.

2864. The system of claim 2853, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

2865. The system of claim 2853, further comprising a conductor disposed in a second conduit, wherein the second conduit is disposed within the opening, and wherein the conductor is configured to heat at least a portion of the formation during application of an electrical current to the conductor.

2866. The system of claim 2853, further comprising an insulated conductor disposed within the opening, wherein the insulated conductor is configured to heat at least a

portion of the formation during application of an electrical current to the insulated conductor.

2867. The system of claim 2853, further comprising at least one elongated member disposed within the opening, wherein the at least the one elongated member is configured to heat at least a portion of the formation during application of an electrical current to the at least the one elongated member.

2868. The system of claim 2853, further comprising a heat exchanger disposed external to the formation, wherein the heat exchanger is configured to heat the oxidizing fluid, wherein the conduit is further configured to provide the heated oxidizing fluid into the opening during use, and wherein the heated oxidizing fluid is configured to heat at least a portion of the formation during use.

2869. The system of claim 2853, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

2870. The system of claim 2853, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

2871. The system of claim 2853, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

2872. The system of claim 2853, further comprising an overburden casing coupled to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

2873. The system of claim 2853, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is configured to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

2874. The system of claim 2853, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

2875. The system of claim 2853, wherein the system is further configured such that transferred heat can pyrolyze at least some hydrocarbons in the pyrolysis zone.

2876. A system configurable to heat a coal formation, comprising:

a heater configurable to be disposed in an opening in the formation, wherein the heater is further configurable to provide heat to at least a portion of the formation during use;

a conduit configurable to be disposed in the opening, wherein the conduit is further configurable to provide an oxidizing fluid from an oxidizing fluid source to a reaction zone in the formation during use, wherein the system is configurable to allow the oxidizing fluid to oxidize at least some hydrocarbons at the reaction zone during use such that heat is generated at the reaction zone, and wherein the conduit is further configurable to remove an oxidation product from the formation during use; and

wherein the system is further configurable to allow heat to transfer substantially by conduction from the reaction zone to a pyrolysis zone during use.

2877. The system of claim 2876, wherein the oxidizing fluid is configurable to generate heat in the reaction zone such that the oxidizing fluid is transported through the reaction zone substantially by diffusion.

2878. The system of claim 2876, wherein the conduit comprises orifices. and wherein the orifices are configurable to provide the oxidizing fluid into the opening.

2879. The system of claim 2876, wherein the conduit comprises critical flow orifices, and wherein the critical flow orifices are configurable to control a flow of the oxidizing fluid such that a rate of oxidation in the formation is controlled.

2880. The system of claim 2876, wherein the conduit is further configurable to be cooled with the oxidizing fluid such that the conduit is not substantially heated by oxidation.

2881. The system of claim 2876, wherein the conduit is further configurable such that the oxidation product transfers heat to the oxidizing fluid.

2882. The system of claim 2876, wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

2883. The system of claim 2876, wherein a pressure of the oxidizing fluid in the conduit and a pressure of the oxidation product in the conduit are controlled to reduce contamination of the oxidation product by the oxidizing fluid.

2884. The system of claim 2876. wherein the oxidation product is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

2885. The system of claim 2876, wherein the oxidizing fluid is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

2886. The system of claim 2876, further comprising a center conduit disposed within the conduit, wherein center conduit is configurable to provide the oxidizing fluid into the opening during use.

2887. The system of claim 2876, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

2888. The system of claim 2876, further comprising a conductor disposed in a second conduit, wherein the second conduit is disposed within the opening, and wherein the conductor is configurable to heat at least a portion of the formation during application of an electrical current to the conductor.

2889. The system of claim 2876, further comprising an insulated conductor disposed within the opening, wherein the insulated conductor is configurable to heat at least a portion of the formation during application of an electrical current to the insulated conductor.

2890. The system of claim 2876, further comprising at least one elongated member disposed within the opening, wherein the at least the one elongated member is configurable to heat at least a portion of the formation during application of an electrical current to the at least the one elongated member.

2891. The system of claim 2876, further comprising a heat exchanger disposed external to the formation, wherein the heat exchanger is configurable to heat the oxidizing fluid, wherein the conduit is further configurable to provide the heated oxidizing fluid into the opening during use, and wherein the heated oxidizing fluid is configurable to heat at least a portion of the formation during use.

2892. The system of claim 2876, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

2893. The system of claim 2876, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

2894. The system of claim 2876, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

2895. The system of claim 2876, further comprising an overburden casing coupled to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

2896. The system of claim 2876, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is configurable to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

2897. The system of claim 2876, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

2898. The system of claim 2876, wherein the system is further configurable such that transferred heat can pyrolyze at least some hydrocarbons in the pyrolysis zone.

2899. An in situ method for heating a coal formation, comprising:

heating a portion of the formation to a temperature sufficient to support reaction of hydrocarbons within the portion of the formation with an oxidizing fluid, wherein the portion is located substantially adjacent to an opening in the formation;

providing the oxidizing fluid to a reaction zone in the formation;

allowing the oxidizing gas to react with at least a portion of the hydrocarbons at the reaction zone to generate heat in the reaction zone;

removing at least a portion of an oxidation product through the opening; and

transferring the generated heat substantially by conduction from the reaction zone to a pyrolysis zone in the formation.

2900. The method of claim 2899, further comprising transporting the oxidizing fluid through the reaction zone by diffusion.

2901. The method of claim 2899, further comprising directing at least a portion of the oxidizing fluid into the opening through orifices of a conduit disposed in the opening.

2902. The method of claim 2899, further comprising controlling a flow of the oxidizing fluid with critical flow orifices of a conduit disposed in the opening such that a rate of oxidation is controlled.

2903. The method of claim 2899, further comprising increasing a flow of the oxidizing fluid in the opening to accommodate an increase in a volume of the reaction zone such that a rate of oxidation is substantially maintained within the reaction zone.

2904. The method of claim 2899, wherein a conduit is disposed in the opening. the method further comprising cooling the conduit with the oxidizing fluid such that the conduit is not substantially heated by oxidation.

2905. The method of claim 2899, wherein a conduit is disposed within the opening, and wherein removing at least the portion of the oxidation product through the opening comprises removing at least the portion of the oxidation product through the conduit.

2906. The method of claim 2899, wherein a conduit is disposed within the opening, and wherein removing at least the portion of the oxidation product through the opening comprises removing at least the portion of the oxidation product through the conduit, the method further comprising transferring substantial heat from the oxidation product in the conduit to the oxidizing fluid in the conduit.

2907. The method of claim 2899, wherein a conduit is disposed within the opening, wherein removing at least the portion of the oxidation product through the opening comprises removing at least the portion of the oxidation product through the conduit, and wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

2908. The method of claim 2899, wherein a conduit is disposed within the opening, and wherein removing at least the portion of the oxidation product through the opening comprises removing at least the portion of the oxidation product through the conduit, the method further comprising controlling a pressure between the oxidizing fluid and the oxidation product in the conduit to reduce contamination of the oxidation product by the oxidizing fluid.

2909. The method of claim 2899, wherein a conduit is disposed within the opening, and wherein removing at least the portion of the oxidation product through the opening comprises removing at least the portion of the oxidation product through the conduit, the method further comprising substantially inhibiting the oxidation product from flowing into portions of the formation beyond the reaction zone.

2910. The method of claim 2899, further comprising substantially inhibiting the oxidizing fluid from flowing into portions of the formation beyond the reaction zone.

2911. The method of claim 2899, wherein a center conduit is disposed within an outer conduit, and wherein the outer conduit is disposed within the opening, the method further comprising providing the oxidizing fluid into the opening through the center conduit and removing at least a portion of the oxidation product through the outer conduit.

2912. The method of claim 2899, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

2913. The method of claim 2899, wherein heating the portion comprises applying electrical current to a conductor disposed in a conduit, wherein the conduit is disposed within the opening.

2914. The method of claim 2899, wherein heating the portion comprises applying electrical current to an insulated conductor disposed within the opening.

2915. The method of claim 2899, wherein heating the portion comprises applying electrical current to at least one elongated member disposed within the opening.

2916. The method of claim 2899, wherein heating the portion comprises heating the oxidizing fluid in a heat exchanger disposed external to the formation such that providing the oxidizing fluid into the opening comprises transferring heat from the heated oxidizing fluid to the portion.

2917. The method of claim 2899, further comprising removing water from the formation prior to heating the portion.

2918. The method of claim 2899, further comprising controlling the temperature of the formation to substantially inhibit production of oxides of nitrogen during oxidation.

2919. The method of claim 2899, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation.

2920. The method of claim 2899, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

2921. The method of claim 2899, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

2922. The method of claim 2899, further comprising coupling an overburden casing to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

2923. The method of claim 2899, wherein the pyrolysis zone is substantially adjacent to the reaction.

2924. A system configured to heat a coal formation, comprising:

an electric heater disposed in an opening in the formation, wherein the electric heater is configured to provide heat to at least a portion of the formation during use;

an oxidizing fluid source;

a conduit disposed in the opening, wherein the conduit is configured to provide an oxidizing fluid from the oxidizing fluid source to a reaction zone in the formation during use, and wherein the oxidizing fluid is selected to oxidize at least some hydrocarbons at the reaction zone during use such that heat is generated at the reaction zone; and

wherein the system is configured to allow heat to transfer substantially by conduction from the reaction zone to a pyrolysis zone of the formation during use.

2925. The system of claim 2924, wherein the oxidizing fluid is configured to generate heat in the reaction zone such that the oxidizing fluid is transported through the reaction zone substantially by diffusion.

2926. The system of claim 2924, wherein the conduit comprises orifices, and wherein the orifices are configured to provide the oxidizing fluid into the opening.

2927. The system of claim 2924, wherein the conduit comprises critical flow orifices, and wherein the critical flow orifices are configured to control a flow of the oxidizing fluid such that a rate of oxidation in the formation is controlled.

2928. The system of claim 2924, wherein the conduit is further configured to be cooled with the oxidizing fluid such that the conduit is not substantially heated by oxidation.

2929. The system of claim 2924, wherein the conduit is further configured to remove an oxidation product.

2930. The system of claim 2924, wherein the conduit is further configured to remove an oxidation product, such that the oxidation product transfers heat to the oxidizing fluid.

2931. The system of claim 2924, wherein the conduit is further configured to remove an oxidation product, and wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

2932. The system of claim 2924, wherein the conduit is further configured to remove an oxidation product, and wherein a pressure of the oxidizing fluid in the conduit and a pressure of the oxidation product in the conduit are controlled to reduce contamination of the oxidation product by the oxidizing fluid.

2933. The system of claim 2924, wherein the conduit is further configured to remove an oxidation product, and wherein the oxidation product is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

2934. The system of claim 2924, wherein the oxidizing fluid is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

2935. The system of claim 2924, further comprising a center conduit disposed within the conduit, wherein the center conduit is configured to provide the oxidizing fluid into

the opening during use. and wherein the conduit is further configured to remove an oxidation product during use.

2936. The system of claim 2924, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

2937. The system of claim 2924, further comprising an overburden casing coupled to the opening. wherein the overburden casing is disposed in an overburden of the formation.

2938. The system of claim 2924, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

2939. The system of claim 2924, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation. and wherein the overburden casing is further disposed in cement.

2940. The system of claim 2924, further comprising an overburden casing coupled to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

2941. The system of claim 2924, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is configured to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

2942. The system of claim 2924, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the

formation. wherein a packing material is disposed at a junction of the overburden casing and the opening. and wherein the packing material comprises cement.

2943. The system of claim 2924, wherein the system is further configured such that transferred heat can pyrolyze at least some hydrocarbons in the pyrolysis zone.

2944. A system configurable to heat a coal formation, comprising:

an electric heater configurable to be disposed in an opening in the formation, wherein the electric heater is further configurable to provide heat to at least a portion of the formation during use. and wherein at least the portion is located substantially adjacent to the opening;

a conduit configurable to be disposed in the opening, wherein the conduit is further configurable to provide an oxidizing fluid from an oxidizing fluid source to a reaction zone in the formation during use, and wherein the system is configurable to allow the oxidizing fluid to oxidize at least some hydrocarbons at the reaction zone during use such that heat is generated at the reaction zone; and

wherein the system is further configurable to allow heat to transfer substantially by conduction from the reaction zone to a pyrolysis zone of the formation during use.

2945. The system of claim 2944, wherein the oxidizing fluid is configurable to generate heat in the reaction zone such that the oxidizing fluid is transported through the reaction zone substantially by diffusion.

2946. The system of claim 2944. wherein the conduit comprises orifices. and wherein the orifices are configurable to provide the oxidizing fluid into the opening.

2947. The system of claim 2944, wherein the conduit comprises critical flow orifices, and wherein the critical flow orifices are configurable to control a flow of the oxidizing fluid such that a rate of oxidation in the formation is controlled.

2948. The system of claim 2944, wherein the conduit is further configurable to be cooled with the oxidizing fluid such that the conduit is not substantially heated by oxidation.

2949. The system of claim 2944, wherein the conduit is further configurable to remove an oxidation product.

2950. The system of claim 2944, wherein the conduit is further configurable to remove an oxidation product such that the oxidation product transfers heat to the oxidizing fluid.

2951. The system of claim 2944, wherein the conduit is further configurable to remove an oxidation product, and wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

2952. The system of claim 2944, wherein the conduit is further configurable to remove an oxidation product, and wherein a pressure of the oxidizing fluid in the conduit and a pressure of the oxidation product in the conduit are controlled to reduce contamination of the oxidation product by the oxidizing fluid.

2953. The system of claim 2944, wherein the conduit is further configurable to remove an oxidation product, and wherein the oxidation product is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

2954. The system of claim 2944, wherein the oxidizing fluid is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

2955. The system of claim 2944, further comprising a center conduit disposed within the conduit, wherein center conduit is configurable to provide the oxidizing fluid into the opening during use, and wherein the conduit is further configurable to remove an oxidation product during use.

2956. The system of claim 2944, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

2957. The system of claim 2944, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

2958. The system of claim 2944, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation. and wherein the overburden casing comprises steel.

2959. The system of claim 2944, further comprising an overburden casing coupled to the opening. wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

2960. The system of claim 2944, further comprising an overburden casing coupled to the opening. wherein a packing material is disposed at a junction of the overburden casing and the opening.

2961.. The system of claim 2944, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening. and wherein the packing material is configurable to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

2962. The system of claim 2944, further comprising an overburden casing coupled to the opening. wherein the overburden casing is disposed in an overburden of the formation. wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

2963. The system of claim 2944, wherein the system is further configurable such that transferred heat can pyrolyze at least some hydrocarbons in the pyrolysis zone.

2964. A system configured to heat a coal formation, comprising:

a conductor disposed in a first conduit, wherein the first conduit is disposed in an opening in the formation, and wherein the conductor is configured to provide heat to at least a portion of the formation during use;

an oxidizing fluid source;

a second conduit disposed in the opening, wherein the second conduit is configured to provide an oxidizing fluid from the oxidizing fluid source to a reaction zone in the formation during use, and wherein the oxidizing fluid is selected to oxidize at least some hydrocarbons at the reaction zone during use such that heat is generated at the reaction zone; and

wherein the system is configured to allow heat to transfer substantially by conduction from the reaction zone to a pyrolysis zone of the formation during use.

2965. The system of claim 2964, wherein the oxidizing fluid is configured to generate heat in the reaction zone such that the oxidizing fluid is transported through the reaction zone substantially by diffusion.

2966. The system of claim 2964, wherein the second conduit comprises orifices, and wherein the orifices are configured to provide the oxidizing fluid into the opening.

2967. The system of claim 2964, wherein the second conduit comprises critical flow orifices, and wherein the critical flow orifices are configured to control a flow of the oxidizing fluid such that a rate of oxidation in the formation is controlled.

2968. The system of claim 2964, wherein the second conduit is further configured to be cooled with the oxidizing fluid to reduce heating of the second conduit by oxidation.

2969. The system of claim 2964, wherein the second conduit is further configured to remove an oxidation product.

2970. The system of claim 2964, wherein the second conduit is further configured to remove an oxidation product such that the oxidation product transfers heat to the oxidizing fluid.

2971. The system of claim 2964, wherein the second conduit is further configured to remove an oxidation product, and wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the second conduit.

2972. The system of claim 2964, wherein the second conduit is further configured to remove an oxidation product, and wherein a pressure of the oxidizing fluid in the second conduit and a pressure of the oxidation product in the second conduit are controlled to reduce contamination of the oxidation product by the oxidizing fluid.

2973. The system of claim 2964, wherein the second conduit is further configured to remove an oxidation product, and wherein the oxidation product is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

2974. The system of claim 2964, wherein the oxidizing fluid is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

2975. The system of claim 2964, further comprising a center conduit disposed within the second conduit, wherein the center conduit is configured to provide the oxidizing fluid into the opening during use, and wherein the second conduit is further configured to remove an oxidation product during use.

2976. The system of claim 2964, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

2977. The system of claim 2964, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

2978. The system of claim 2964, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

2979. The system of claim 2964, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

2980. The system of claim 2964, further comprising an overburden casing coupled to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

2981. The system of claim 2964, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is configured to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

2982. The system of claim 2964, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

2983. The system of claim 2964, wherein the system is further configured such that transferred heat can pyrolyze at least some hydrocarbons in the pyrolysis zone.

2984. A system configurable to heat a coal formation, comprising:

a conductor configurable to be disposed in a first conduit, wherein the first conduit is configurable to be disposed in an opening in the formation. and wherein the conductor is further configurable to provide heat to at least a portion of the formation during use;

a second conduit configurable to be disposed in the opening. wherein the second conduit is further configurable to provide an oxidizing fluid from an oxidizing fluid source to a reaction zone in the formation during use, and wherein the system is configurable to allow the oxidizing fluid to oxidize at least some hydrocarbons at the reaction zone during use such that heat is generated at the reaction zone; and

wherein the system is further configurable to allow heat to transfer substantially by conduction from the reaction zone to a pyrolysis zone of the formation during use.

2985. The system of claim 2984. wherein the oxidizing fluid is configurable to generate heat in the reaction zone such that the oxidizing fluid is transported through the reaction zone substantially by diffusion.

2986. The system of claim 2984, wherein the second conduit comprises orifices, and wherein the orifices are configurable to provide the oxidizing fluid into the opening.

2987. The system of claim 2984, wherein the second conduit comprises critical flow orifices, and wherein the critical flow orifices are configurable to control a flow of the oxidizing fluid such that a rate of oxidation in the formation is controlled.

2988. The system of claim 2984, wherein the second conduit is further configurable to be cooled with the oxidizing fluid to reduce heating of the second conduit by oxidation.

2989. The system of claim 2984, wherein the second conduit is further configurable to remove an oxidation product.

2990. The system of claim 2984. wherein the second conduit is further configurable to remove an oxidation product such that the oxidation product transfers heat to the oxidizing fluid.

2991. The system of claim 2984, wherein the second conduit is further configurable to remove an oxidation product, and wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the second conduit.

2992. The system of claim 2984, wherein the second conduit is further configurable to remove an oxidation product, and wherein a pressure of the oxidizing fluid in the second conduit and a pressure of the oxidation product in the second conduit are controlled to reduce contamination of the oxidation product by the oxidizing fluid.

2993. The system of claim 2984, wherein the second conduit is further configurable to remove an oxidation product, and wherein the oxidation product is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

2994. The system of claim 2984, wherein the oxidizing fluid is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

2995. The system of claim 2984, further comprising a center conduit disposed within the second conduit, wherein center conduit is configurable to provide the oxidizing fluid into the opening during use. and wherein the second conduit is further configurable to remove an oxidation product during use.

2996. The system of claim 2984, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

2997. The system of claim 2984, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

2998. The system of claim 2984, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

2999. The system of claim 2984, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3000. The system of claim 2984, further comprising an overburden casing coupled to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

3001. The system of claim 2984, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is configurable to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3002. The system of claim 2984, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

3003. The system of claim 2984, wherein the system is further configurable such that transferred heat can pyrolyze at least some hydrocarbons in the pyrolysis zone.

3004. An in situ method for heating a coal formation, comprising:

heating a portion of the formation to a temperature sufficient to support reaction of hydrocarbons within the portion of the formation with an oxidizing fluid, wherein heating comprises applying an electrical current to a conductor disposed in a first conduit

to provide heat to the portion, and wherein the first conduit is disposed within the opening;

providing the oxidizing fluid to a reaction zone in the formation;

allowing the oxidizing fluid to react with at least a portion of the hydrocarbons at the reaction zone to generate heat at the reaction zone; and

transferring the generated heat substantially by conduction from the reaction zone to a pyrolysis zone in the formation.

3005. The method of claim 3004, further comprising transporting the oxidizing fluid through the reaction zone by diffusion.

3006. The method of claim 3004, further comprising directing at least a portion of the oxidizing fluid into the opening through orifices of a second conduit disposed in the opening.

3007. The method of claim 3004, further comprising controlling a flow of the oxidizing fluid with critical flow orifices of a second conduit disposed in the opening such that a rate of oxidation is controlled.

3008. The method of claim 3004, further comprising increasing a flow of the oxidizing fluid in the opening to accommodate an increase in a volume of the reaction zone such that a rate of oxidation is substantially constant over time within the reaction zone.

3009. The method of claim 3004, wherein a second conduit is disposed in the opening, the method further comprising cooling the second conduit with the oxidizing fluid to reduce heating of the second conduit by oxidation.

3010. The method of claim 3004, wherein a second conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the second conduit.

3011. The method of claim 3004, wherein a second conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the second conduit and transferring heat from the oxidation product in the conduit to the oxidizing fluid in the second conduit.

3012. The method of claim 3004, wherein a second conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the second conduit, wherein a flow rate of the oxidizing fluid in the second conduit is approximately equal to a flow rate of the oxidation product in the second conduit.

3013. The method of claim 3004, wherein a second conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the second conduit and controlling a pressure between the oxidizing fluid and the oxidation product in the second conduit to reduce contamination of the oxidation product by the oxidizing fluid.

3014. The method of claim 3004, wherein a second conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit and substantially inhibiting the oxidation product from flowing into portions of the formation beyond the reaction zone.

3015. The method of claim 3004, further comprising substantially inhibiting the oxidizing fluid from flowing into portions of the formation beyond the reaction zone.

3016. The method of claim 3004, wherein a center conduit is disposed within an outer conduit, and wherein the outer conduit is disposed within the opening, the method further comprising providing the oxidizing fluid into the opening through the center conduit and removing an oxidation product through the outer conduit.

3017. The method of claim 3004, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

3018. The method of claim 3004, further comprising removing water from the formation prior to heating the portion.

3019. The method of claim 3004, further comprising controlling the temperature of the formation to substantially inhibit production of oxides of nitrogen during oxidation.

3020. The method of claim 3004, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3021. The method of claim 3004, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3022. The method of claim 3004, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3023. The method of claim 3004, further comprising coupling an overburden casing to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

3024. A system configured to heat a coal formation, comprising:

an insulated conductor disposed in an opening in the formation, wherein the insulated conductor is configured to provide heat to at least a portion of the formation during use;

an oxidizing fluid source;

a conduit disposed in the opening, wherein the conduit is configured to provide an oxidizing fluid from the oxidizing fluid source to a reaction zone in the formation during use, and wherein the oxidizing fluid is selected to oxidize at least some hydrocarbons at the reaction zone during use such that heat is generated at the reaction zone; and

wherein the system is configured to allow heat to transfer substantially by conduction from the reaction zone to a pyrolysis zone of the formation during use.

3025. The system of claim 3024, wherein the oxidizing fluid is configured to generate heat in the reaction zone such that the oxidizing fluid is transported through the reaction zone substantially by diffusion.

3026. The system of claim 3024, wherein the conduit comprises orifices, and wherein the orifices are configured to provide the oxidizing fluid into the opening.

3027. The system of claim 3024, wherein the conduit comprises critical flow orifices, and wherein the critical flow orifices are configured to control a flow of the oxidizing fluid such that a rate of oxidation in the formation is controlled.

3028. The system of claim 3024, wherein the conduit is configured to be cooled with the oxidizing fluid such that the conduit is not substantially heated by oxidation.

3029. The system of claim 3024, wherein the conduit is further configured to remove an oxidation product.

3030. The system of claim 3024, wherein the conduit is further configured to remove an oxidation product, and wherein the conduit is further configured such that the oxidation product transfers substantial heat to the oxidizing fluid.

3031. The system of claim 3024, wherein the conduit is further configured to remove an oxidation product, and wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

3032. The system of claim 3024, wherein the conduit is further configured to remove an oxidation product, and wherein a pressure of the oxidizing fluid in the second conduit and a pressure of the oxidation product in the conduit are controlled to reduce contamination of the oxidation product by the oxidizing fluid.

3033. The system of claim 3024, wherein the conduit is further configured to remove an oxidation product, and wherein the oxidation product is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

3034. The system of claim 3024, wherein the oxidizing fluid is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

3035. The system of claim 3024, further comprising a center conduit disposed within the conduit, wherein the center conduit is configured to provide the oxidizing fluid into the opening during use, and wherein the conduit is further configured to remove an oxidation product during use.

3036. The system of claim 3024, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

3037. The system of claim 3024, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3038. The system of claim 3024, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3039. The system of claim 3024, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3040. The system of claim 3024, further comprising an overburden casing coupled to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

3041. The system of claim 3024, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is configured to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3042. The system of claim 3024, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

3043. The system of claim 3024, wherein the system is further configured such that transferred heat can pyrolyze at least some hydrocarbons in the pyrolysis zone.

3044. A system configurable to heat a coal formation, comprising:

an insulated conductor configurable to be disposed in an opening in the formation, wherein the insulated conductor is further configurable to provide heat to at least a portion of the formation during use;

a conduit configurable to be disposed in the opening, wherein the conduit is further configurable to provide an oxidizing fluid from an oxidizing fluid source to a reaction zone in the formation during use, and wherein the system is configurable to allow the oxidizing fluid to oxidize at least some hydrocarbons at the reaction zone during use such that heat is generated at the reaction zone; and

wherein the system is further configurable to allow heat to transfer substantially by conduction from the reaction zone to a pyrolysis zone of the formation during use.

3045. The system of claim 3044, wherein the oxidizing fluid is configurable to generate heat in the reaction zone such that the oxidizing fluid is transported through the reaction zone substantially by diffusion.

3046. The system of claim 3044, wherein the conduit comprises orifices, and wherein the orifices are configurable to provide the oxidizing fluid into the opening.

3047. The system of claim 3044, wherein the conduit comprises critical flow orifices, and wherein the critical flow orifices are configurable to control a flow of the oxidizing fluid such that a rate of oxidation in the formation is controlled.

3048. The system of claim 3044, wherein the conduit is further configurable to be cooled with the oxidizing fluid such that the conduit is not substantially heated by oxidation.

3049. The system of claim 3044, wherein the conduit is further configurable to remove an oxidation product.

3050. The system of claim 3044, wherein the conduit is further configurable to remove an oxidation product, such that the oxidation product transfers heat to the oxidizing fluid.

3051. The system of claim 3044, wherein the conduit is further configurable to remove an oxidation product, and wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

3052. The system of claim 3044, wherein the conduit is further configurable to remove an oxidation product, and wherein a pressure of the oxidizing fluid in the conduit and a

pressure of the oxidation product in the conduit are controlled to reduce contamination of the oxidation product by the oxidizing fluid.

3053. The system of claim 3044, wherein the conduit is further configurable to remove an oxidation product, and wherein the oxidation product is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

3054. The system of claim 3044, wherein the oxidizing fluid is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

3055. The system of claim 3044, further comprising a center conduit disposed within the conduit, wherein center conduit is configurable to provide the oxidizing fluid into the opening during use, and wherein the conduit is further configurable to remove an oxidation product during use.

3056. The system of claim 3044, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

3057. The system of claim 3044, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3058. The system of claim 3044, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3059. The system of claim 3044, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3060. The system of claim 3044, further comprising an overburden casing coupled to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

3061. The system of claim 3044, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is configurable to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3062. The system of claim 3044, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

3063. The system of claim 3044, wherein the system is further configurable such that transferred heat can pyrolyze at least some hydrocarbons in the pyrolysis zone.

3064. An in situ method for heating a coal formation, comprising:

heating a portion of the formation to a temperature sufficient to support reaction of hydrocarbons within the portion of the formation with an oxidizing fluid, wherein heating comprises applying an electrical current to an insulated conductor to provide heat to the portion, and wherein the insulated conductor is disposed within the opening;

providing the oxidizing fluid to a reaction zone in the formation;

allowing the oxidizing fluid to react with at least a portion of the hydrocarbons at the reaction zone to generate heat at the reaction zone; and

transferring the generated heat substantially by conduction from the reaction zone to a pyrolysis zone in the formation.

3065. The method of claim 3064, further comprising transporting the oxidizing fluid through the reaction zone by diffusion.

3066. The method of claim 3064, further comprising directing at least a portion of the oxidizing fluid into the opening through orifices of a conduit disposed in the opening.

3067. The method of claim 3064, further comprising controlling a flow of the oxidizing fluid with critical flow orifices of a conduit disposed in the opening such that a rate of oxidation is controlled.

3068. The method of claim 3064, further comprising increasing a flow of the oxidizing fluid in the opening to accommodate an increase in a volume of the reaction zone such that a rate of oxidation is substantially constant over time within the reaction zone.

3069. The method of claim 3064, wherein a conduit is disposed in the opening, the method further comprising cooling the conduit with the oxidizing fluid to reduce heating of the conduit by oxidation.

3070. The method of claim 3064, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit.

3071. The method of claim 3064, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit and transferring heat from the oxidation product in the conduit to the oxidizing fluid in the conduit.

3072. The method of claim 3064, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit, wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

3073. The method of claim 3064, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit and controlling a pressure between the oxidizing fluid and the oxidation product in the conduit to reduce contamination of the oxidation product by the oxidizing fluid.

3074. The method of claim 3064, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit and substantially inhibiting the oxidation product from flowing into portions of the formation beyond the reaction zone.

3075. The method of claim 3064, further comprising substantially inhibiting the oxidizing fluid from flowing into portions of the formation beyond the reaction zone.

3076. The method of claim 3064, wherein a center conduit is disposed within an outer conduit, and wherein the outer conduit is disposed within the opening, the method further comprising providing the oxidizing fluid into the opening through the center conduit and removing an oxidation product through the outer conduit.

3077. The method of claim 3064, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

3078. The method of claim 3064, further comprising removing water from the formation prior to heating the portion.

3079. The method of claim 3064, further comprising controlling the temperature of the formation to substantially inhibit production of oxides of nitrogen during oxidation.

3080. The method of claim 3064, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3081. The method of claim 3064, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3082. The method of claim 3064, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3083. The method of claim 3064, further comprising coupling an overburden casing to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

3084. The method of claim 3064, wherein the pyrolysis zone is substantially adjacent to the reaction zone.

3085. An in situ method for heating a coal formation, comprising:

heating a portion of the formation to a temperature sufficient to support reaction of hydrocarbons within the portion of the formation with an oxidizing fluid, wherein the portion is located substantially adjacent to an opening in the formation, wherein heating comprises applying an electrical current to an insulated conductor to provide heat to the portion, wherein the insulated conductor is coupled to a conduit, wherein the conduit comprises critical flow orifices, and wherein the conduit is disposed within the opening;

providing the oxidizing fluid to a reaction zone in the formation;

allowing the oxidizing fluid to react with at least a portion of the hydrocarbons at the reaction zone to generate heat at the reaction zone; and

transferring the generated heat substantially by conduction from the reaction zone to a pyrolysis zone in the formation.

3086. The method of claim 3085, further comprising transporting the oxidizing fluid through the reaction zone by diffusion.

3087. The method of claim 3085, further comprising controlling a flow of the oxidizing fluid with the critical flow orifices such that a rate of oxidation is controlled.

3088. The method of claim 3085, further comprising increasing a flow of the oxidizing fluid in the opening to accommodate an increase in a volume of the reaction zone such that a rate of oxidation is substantially constant over time within the reaction zone.

3089. The method of claim 3085, further comprising cooling the conduit with the oxidizing fluid to reduce heating of the conduit by oxidation.

3090. The method of claim 3085, further comprising removing an oxidation product from the formation through the conduit.

3091. The method of claim 3085, further comprising removing an oxidation product from the formation through the conduit and transferring heat from the oxidation product in the conduit to the oxidizing fluid in the conduit.

3092. The method of claim 3085, further comprising removing an oxidation product from the formation through the conduit, wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

3093. The method of claim 3085, further comprising removing an oxidation product from the formation through the conduit and controlling a pressure between the oxidizing fluid and the oxidation product in the conduit to reduce contamination of the oxidation product by the oxidizing fluid.

3094. The method of claim 3085, further comprising removing an oxidation product from the formation through the conduit and substantially inhibiting the oxidation product from flowing into portions of the formation beyond the reaction zone.

3095. The method of claim 3085, further comprising substantially inhibiting the oxidizing fluid from flowing into portions of the formation beyond the reaction zone.

3096. The method of claim 3085, wherein a center conduit is disposed within the conduit, the method further comprising providing the oxidizing fluid into the opening through the center conduit and removing an oxidation product through the conduit.

3097. The method of claim 3085, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

3098. The method of claim 3085, further comprising removing water from the formation prior to heating the portion.

3099. The method of claim 3085, further comprising controlling the temperature of the formation to substantially inhibit production of oxides of nitrogen during oxidation.

3100. The method of claim 3085, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3101. The method of claim 3085, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3102. The method of claim 3085, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3103. The method of claim 3085, further comprising coupling an overburden casing to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

3104. The method of claim 3085, wherein the pyrolysis zone is substantially adjacent to the reaction zone.

3105. A system configured to heat a coal formation, comprising:

at least one elongated member disposed in an opening in the formation, wherein at least the one elongated member is configured to provide heat to at least a portion of the formation during use;

an oxidizing fluid source;

a conduit disposed in the opening, wherein the conduit is configured to provide an oxidizing fluid from the oxidizing fluid source to a reaction zone in the formation during use, and wherein the oxidizing fluid is selected to oxidize at least some hydrocarbons at the reaction zone during use such that heat is generated at the reaction zone; and

wherein the system is configured to allow heat to transfer substantially by conduction from the reaction zone to a pyrolysis zone of the formation during use.

3106. The system of claim 3105, wherein the oxidizing fluid is configured to generate heat in the reaction zone such that the oxidizing fluid is transported through the reaction zone substantially by diffusion.

3107. The system of claim 3105, wherein the conduit comprises orifices, and wherein the orifices are configured to provide the oxidizing fluid into the opening.

3108. The system of claim 3105, wherein the conduit comprises critical flow orifices, and wherein the critical flow orifices are configured to control a flow of the oxidizing fluid such that a rate of oxidation in the formation is controlled.

3109. The system of claim 3105, wherein the conduit is further configured to be cooled with the oxidizing fluid such that the conduit is not substantially heated by oxidation.

3110. The system of claim 3105, wherein the conduit is further configured to remove an oxidation product.

3111. The system of claim 3105, wherein the conduit is further configured to remove an oxidation product such that the oxidation product transfers heat to the oxidizing fluid.

3112. The system of claim 3105, wherein the conduit is further configured to remove an oxidation product, and wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

3113. The system of claim 3105, wherein the conduit is further configured to remove an oxidation product, and wherein a pressure of the oxidizing fluid in the conduit and a pressure of the oxidation product in the conduit are controlled to reduce contamination of the oxidation product by the oxidizing fluid.

3114. The system of claim 3105, wherein the conduit is further configured to remove an oxidation product, and wherein the oxidation product is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

3115. The system of claim 3105, wherein the oxidizing fluid is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

3116. The system of claim 3105, further comprising a center conduit disposed within the conduit, wherein the center conduit is configured to provide the oxidizing fluid into the opening during use, and wherein the conduit is further configured to remove an oxidation product during use.

3117. The system of claim 3105, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

3118. The system of claim 3105, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3119. The system of claim 3105, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3120. The system of claim 3105, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3121. The system of claim 3105, further comprising an overburden casing coupled to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

3122. The system of claim 3105, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is configured to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3123. The system of claim 3105, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

3124. The system of claim 3105, wherein the system is further configured such that transferred heat can pyrolyze at least some hydrocarbons in the pyrolysis zone.

3125. A system configurable to heat a coal formation, comprising:

at least one elongated member configurable to be disposed in an opening in the formation, wherein at least the one elongated member is further configurable to provide heat to at least a portion of the formation during use;

a conduit configurable to be disposed in the opening, wherein the conduit is further configurable to provide an oxidizing fluid from the oxidizing fluid source to a reaction zone in the formation during use, and wherein the system is configurable to allow the oxidizing fluid to oxidize at least some hydrocarbons at the reaction zone during use such that heat is generated at the reaction zone; and

wherein the system is further configurable to allow heat to transfer substantially by conduction from the reaction zone to a pyrolysis zone of the formation during use.

3126. The system of claim 3125, wherein the oxidizing fluid is configurable to generate heat in the reaction zone such that the oxidizing fluid is transported through the reaction zone substantially by diffusion.

3127. The system of claim 3125, wherein the conduit comprises orifices, and wherein the orifices are configurable to provide the oxidizing fluid into the opening.

3128. The system of claim 3125, wherein the conduit comprises critical flow orifices, and wherein the critical flow orifices are configurable to control a flow of the oxidizing fluid such that a rate of oxidation in the formation is controlled.

3129. The system of claim 3125, wherein the conduit is further configurable to be cooled with the oxidizing fluid such that the conduit is not substantially heated by oxidation.

3130. The system of claim 3125, wherein the conduit is further configurable to remove an oxidation product.

3131. The system of claim 3125, wherein the conduit is further configurable to remove an oxidation product such that the oxidation product transfers heat to the oxidizing fluid.

3132. The system of claim 3125, wherein the conduit is further configurable to remove an oxidation product, and wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

3133. The system of claim 3125, wherein the conduit is further configurable to remove an oxidation product, and wherein a pressure of the oxidizing fluid in the conduit and a pressure of the oxidation product in the conduit are controlled to reduce contamination of the oxidation product by the oxidizing fluid.

3134. The system of claim 3125, wherein the conduit is further configurable to remove an oxidation product, and wherein the oxidation product is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

3135. The system of claim 3125, wherein the oxidizing fluid is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

3136. The system of claim 3125, further comprising a center conduit disposed within the conduit, wherein center conduit is configurable to provide the oxidizing fluid into the opening during use, and wherein the conduit is further configurable to remove an oxidation product during use.

3137. The system of claim 3125, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

3138. The system of claim 3125, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3139. The system of claim 3125, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3140. The system of claim 3125, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3141. The system of claim 3125, further comprising an overburden casing coupled to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

3142. The system of claim 3125, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is configurable to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3143. The system of claim 3125, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

3144. The system of claim 3125, wherein the system is further configurable such that transferred heat can pyrolyze at least some hydrocarbons in the pyrolysis zone.

3145. An in situ method for heating a coal formation, comprising:

heating a portion of the formation to a temperature sufficient to support reaction of hydrocarbons within the portion of the formation with an oxidizing fluid, wherein heating comprises applying an electrical current to at least one elongated member to

provide heat to the portion, and wherein at least the one elongated member is disposed within the opening;

providing the oxidizing fluid to a reaction zone in the formation;

allowing the oxidizing fluid to react with at least a portion of the hydrocarbons at the reaction zone to generate heat at the reaction zone; and

transferring the generated heat substantially by conduction from the reaction zone to a pyrolysis zone in the formation.

3146. The method of claim 3145, further comprising transporting the oxidizing fluid through the reaction zone by diffusion.

3147. The method of claim 3145, further comprising directing at least a portion of the oxidizing fluid into the opening through orifices of a conduit disposed in the opening.

3148. The method of claim 3145, further comprising controlling a flow of the oxidizing fluid with critical flow orifices of a conduit disposed in the opening such that a rate of oxidation is controlled.

3149. The method of claim 3145, further comprising increasing a flow of the oxidizing fluid in the opening to accommodate an increase in a volume of the reaction zone such that a rate of oxidation is substantially constant over time within the reaction zone.

3150. The method of claim 3145, wherein a conduit is disposed in the opening, the method further comprising cooling the conduit with the oxidizing fluid to reduce heating of the conduit by oxidation.

3151. The method of claim 3145, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit.

3152. The method of claim 3145, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit and transferring heat from the oxidation product in the conduit to the oxidizing fluid in the conduit.

3153. The method of claim 3145, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit, wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

3154. The method of claim 3145, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit and controlling a pressure between the oxidizing fluid and the oxidation product in the conduit to reduce contamination of the oxidation product by the oxidizing fluid.

3155. The method of claim 3145, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit and substantially inhibiting the oxidation product from flowing into portions of the formation beyond the reaction zone.

3156. The method of claim 3145, further comprising substantially inhibiting the oxidizing fluid from flowing into portions of the formation beyond the reaction zone.

3157. The method of claim 3145, wherein a center conduit is disposed within an outer conduit, and wherein the outer conduit is disposed within the opening, the method further comprising providing the oxidizing fluid into the opening through the center conduit and removing an oxidation product through the outer conduit.

3158. The method of claim 3145, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

3159. The method of claim 3145, further comprising removing water from the formation prior to heating the portion.

3160. The method of claim 3145, further comprising controlling the temperature of the formation to substantially inhibit production of oxides of nitrogen during oxidation.

3161. The method of claim 3145, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3162. The method of claim 3145, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3163. The method of claim 3145, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3164. The method of claim 3145, further comprising coupling an overburden casing to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

3165. The method of claim 3145, wherein the pyrolysis zone is substantially adjacent to the reaction zone.

3166. A system configured to heat a coal formation, comprising:

a heat exchanger disposed external to the formation, wherein the heat exchanger is configured to heat an oxidizing fluid during use;

a conduit disposed in the opening, wherein the conduit is configured to provide the heated oxidizing fluid from the heat exchanger to at least a portion of the formation

during use, wherein the system is configured to allow heat to transfer from the heated oxidizing fluid to at least the portion of the formation during use, and wherein the oxidizing fluid is selected to oxidize at least some hydrocarbons at a reaction zone in the formation during use such that heat is generated at the reaction zone; and

wherein the system is configured to allow heat to transfer substantially by conduction from the reaction zone to a pyrolysis zone of the formation during use.

3167. The system of claim 3166, wherein the oxidizing fluid is configured to generate heat in the reaction zone such that the oxidizing fluid is transported through the reaction zone substantially by diffusion.

3168. The system of claim 3166, wherein the conduit comprises orifices, and wherein the orifices are configured to provide the oxidizing fluid into the opening.

3169. The system of claim 3166, wherein the conduit comprises critical flow orifices, and wherein the critical flow orifices are configured to control a flow of the oxidizing fluid such that a rate of oxidation in the formation is controlled.

3170. The system of claim 3166, wherein the conduit is further configured to be cooled with the oxidizing fluid such that the conduit is not substantially heated by oxidation.

3171. The system of claim 3166, wherein the conduit is further configured to remove an oxidation product.

3172. The system of claim 3166, wherein the conduit is further configured to remove an oxidation product, such that the oxidation product transfers heat to the oxidizing fluid.

3173. The system of claim 3166, wherein the conduit is further configured to remove an oxidation product, and wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

3174. The system of claim 3166, wherein the conduit is further configured to remove an oxidation product, and wherein a pressure of the oxidizing fluid in the conduit and a pressure of the oxidation product in the conduit are controlled to reduce contamination of the oxidation product by the oxidizing fluid.

3175. The system of claim 3166, wherein the conduit is further configured to remove an oxidation product, and wherein the oxidation product is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

3176. The system of claim 3166, wherein the oxidizing fluid is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

3177. The system of claim 3166, further comprising a center conduit disposed within the conduit, wherein the center conduit is configured to provide the oxidizing fluid into the opening during use, and wherein the conduit is further configured to remove an oxidation product during use.

3178. The system of claim 3166, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

3179. The system of claim 3166, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3180. The system of claim 3166, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3181. The system of claim 3166, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3182. The system of claim 3166, further comprising an overburden casing coupled to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

3183. The system of claim 3166, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation. wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is configured to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3184. The system of claim 3166, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

3185. A system configurable to heat a coal formation, comprising:

a heat exchanger configurable to be disposed external to the formation, wherein the heat exchanger is further configurable to heat an oxidizing fluid during use;

a conduit configurable to be disposed in the opening, wherein the conduit is further configurable to provide the heated oxidizing fluid from the heat exchanger to at least a portion of the formation during use, wherein the system is configurable to allow heat to transfer from the heated oxidizing fluid to at least the portion of the formation during use, and wherein the system is further configurable to allow the oxidizing fluid to oxidize at least some hydrocarbons at a reaction zone in the formation during use such that heat is generated at the reaction zone; and

wherein the system is further configurable to allow heat to transfer substantially by conduction from the reaction zone to a pyrolysis zone of the formation during use.

3186. The system of claim 3185, wherein the oxidizing fluid is configurable to generate heat in the reaction zone such that the oxidizing fluid is transported through the reaction zone substantially by diffusion.

3187. The system of claim 3185, wherein the conduit comprises orifices, and wherein the orifices are configurable to provide the oxidizing fluid into the opening.

3188. The system of claim 3185, wherein the conduit comprises critical flow orifices, and wherein the critical flow orifices are configurable to control a flow of the oxidizing fluid such that a rate of oxidation in the formation is controlled.

3189. The system of claim 3185, wherein the conduit is further configurable to be cooled with the oxidizing fluid such that the conduit is not substantially heated by oxidation.

3190. The system of claim 3185, wherein the conduit is further configurable to remove an oxidation product.

3191. The system of claim 3185, wherein the conduit is further configurable to remove an oxidation product such that the oxidation product transfers heat to the oxidizing fluid.

3192. The system of claim 3185, wherein the conduit is further configurable to remove an oxidation product, and wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

3193. The system of claim 3185, wherein the conduit is further configurable to remove an oxidation product, and wherein a pressure of the oxidizing fluid in the conduit and a pressure of the oxidation product in the conduit are controlled to reduce contamination of the oxidation product by the oxidizing fluid.

3194. The system of claim 3185, wherein the conduit is further configurable to remove an oxidation product, and wherein the oxidation product is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

3195. The system of claim 3185, wherein the oxidizing fluid is substantially inhibited from flowing into portions of the formation beyond the reaction zone.

3196. The system of claim 3185, further comprising a center conduit disposed within the conduit, wherein center conduit is configurable to provide the oxidizing fluid into the opening during use, and wherein the second conduit is further configurable to remove an oxidation product during use.

3197. The system of claim 3185, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

3198. The system of claim 3185, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3199. The system of claim 3185, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3200. The system of claim 3185, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3201. The system of claim 3185, further comprising an overburden casing coupled to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

3202. The system of claim 3185, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is configurable to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3203. The system of claim 3185, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

NDC (HEAT EXCHANGER PREHEATING METHOD)

3204. An in situ method for heating a coal formation, comprising:

heating a portion of the formation to a temperature sufficient to support reaction of hydrocarbons within the portion of the formation with an oxidizing fluid, wherein heating comprises:

heating the oxidizing fluid with a heat exchanger, wherein the heat exchanger is disposed external to the formation;

providing the heated oxidizing fluid from the heat exchanger to the portion of the formation; and

allowing heat to transfer from the heated oxidizing fluid to the portion of the formation;

providing the oxidizing fluid to a reaction zone in the formation;

allowing the oxidizing fluid to react with at least a portion of the hydrocarbons at the reaction zone to generate heat at the reaction zone; and

transferring the generated heat substantially by conduction from the reaction zone to a pyrolysis zone in the formation.

3205. The method of claim 3204, further comprising transporting the oxidizing fluid through the reaction zone by diffusion.

3206. The method of claim 3204, further comprising directing at least a portion of the oxidizing fluid into the opening through orifices of a conduit disposed in the opening.

3207. The method of claim 3204, further comprising controlling a flow of the oxidizing fluid with critical flow orifices of a conduit disposed in the opening such that a rate of oxidation is controlled.

3208. The method of claim 3204, further comprising increasing a flow of the oxidizing fluid in the opening to accommodate an increase in a volume of the reaction zone such that a rate of oxidation is substantially constant over time within the reaction zone.

3209. The method of claim 3204, wherein a conduit is disposed in the opening, the method further comprising cooling the conduit with the oxidizing fluid to reduce heating of the conduit by oxidation.

3210. The method of claim 3204, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit.

3211. The method of claim 3204, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit and transferring heat from the oxidation product in the conduit to the oxidizing fluid in the conduit.

3212. The method of claim 3204, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit, wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

3213. The method of claim 3204, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through

the conduit and controlling a pressure between the oxidizing fluid and the oxidation product in the conduit to reduce contamination of the oxidation product by the oxidizing fluid.

3214. The method of claim 3204, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit and substantially inhibiting the oxidation product from flowing into portions of the formation beyond the reaction zone.

3215. The method of claim 3204, further comprising substantially inhibiting the oxidizing fluid from flowing into portions of the formation beyond the reaction zone.

3216. The method of claim 3204, wherein a center conduit is disposed within an outer conduit, and wherein the outer conduit is disposed within the opening, the method further comprising providing the oxidizing fluid into the opening through the center conduit and removing an oxidation product through the outer conduit.

3217. The method of claim 3204, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

3218. The method of claim 3204, further comprising removing water from the formation prior to heating the portion.

3219. The method of claim 3204, further comprising controlling the temperature of the formation to substantially inhibit production of oxides of nitrogen during oxidation.

3220. The method of claim 3204, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3221. The method of claim 3204, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3222. The method of claim 3204, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3223. The method of claim 3204, further comprising coupling an overburden casing to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

3224. The method of claim 3204, wherein the pyrolysis zone is substantially adjacent to the reaction zone.

3225. An in situ method for heating a coal formation, comprising:

heating a portion of the formation to a temperature sufficient to support reaction of hydrocarbons within the portion of the formation with an oxidizing fluid, wherein heating comprises:

oxidizing a fuel gas in a heater, wherein the heater is disposed external to the formation;

providing the oxidized fuel gas from the heater to the portion of the formation; and

allowing heat to transfer from the oxidized fuel gas to the portion of the formation;

providing the oxidizing fluid to a reaction zone in the formation;

allowing the oxidizing fluid to react with at least a portion of the hydrocarbons at the reaction zone to generate heat at the reaction zone; and

transferring the generated heat substantially by conduction from the reaction zone to a pyrolysis zone in the formation.

3226. The method of claim 3225, further comprising transporting the oxidizing fluid through the reaction zone by diffusion.

3227. The method of claim 3225, further comprising directing at least a portion of the oxidizing fluid into the opening through orifices of a conduit disposed in the opening.

3228. The method of claim 3225, further comprising controlling a flow of the oxidizing fluid with critical flow orifices of a conduit disposed in the opening such that a rate of oxidation is controlled.

3229. The method of claim 3225, further comprising increasing a flow of the oxidizing fluid in the opening to accommodate an increase in a volume of the reaction zone such that a rate of oxidation is substantially constant over time within the reaction zone.

3230. The method of claim 3225, wherein a conduit is disposed in the opening, the method further comprising cooling the conduit with the oxidizing fluid to reduce heating of the conduit by oxidation.

3231. The method of claim 3225, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit.

3232. The method of claim 3225, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit and transferring heat from the oxidation product in the conduit to the oxidizing fluid in the conduit.

3233. The method of claim 3225, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit, wherein a flow rate of the oxidizing fluid in the conduit is approximately equal to a flow rate of the oxidation product in the conduit.

3234. The method of claim 3225, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit and controlling a pressure between the oxidizing fluid and the oxidation product in the conduit to reduce contamination of the oxidation product by the oxidizing fluid.

3235. The method of claim 3225, wherein a conduit is disposed within the opening, the method further comprising removing an oxidation product from the formation through the conduit and substantially inhibiting the oxidation product from flowing into portions of the formation beyond the reaction zone.

3236. The method of claim 3225, further comprising substantially inhibiting the oxidizing fluid from flowing into portions of the formation beyond the reaction zone.

3237. The method of claim 3225, wherein a center conduit is disposed within an outer conduit, and wherein the outer conduit is disposed within the opening, the method further comprising providing the oxidizing fluid into the opening through the center conduit and removing an oxidation product through the outer conduit.

3238. The method of claim 3225, wherein the portion of the formation extends radially from the opening a width of less than approximately 0.2 m.

3239. The method of claim 3225, further comprising removing water from the formation prior to heating the portion.

3240. The method of claim 3225, further comprising controlling the temperature of the formation to substantially inhibit production of oxides of nitrogen during oxidation.

3241. The method of claim 3225, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3242. The method of claim 3225, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3243. The method of claim 3225, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3244. The method of claim 3225, further comprising coupling an overburden casing to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

3245. The method of claim 3225, wherein the pyrolysis zone is substantially adjacent to the reaction zone.

3246. A system configured to heat a coal formation, comprising:

an insulated conductor disposed within an open wellbore in the formation, wherein the insulated conductor is configured to provide radiant heat to at least a portion of the formation during use; and

wherein the system is configured to allow heat to transfer from the insulated conductor to a selected section of the formation during use.

3247. The system of claim 3246, wherein the insulated conductor is further configured to generate heat during application of an electrical current to the insulated conductor during use.

3248. The system of claim 3246, further comprising a support member, wherein the support member is configured to support the insulated conductor.

3249. The system of claim 3246, further comprising a support member and a centralizer, wherein the support member is configured to support the insulated conductor, and wherein the centralizer is configured to maintain a location of the insulated conductor on the support member.

3250. The system of claim 3246, wherein the open wellbore comprises a diameter of at least approximately 5 cm.

3251. The system of claim 3246, further comprising a lead-in conductor coupled to the insulated conductor, wherein the lead-in conductor comprises a low resistance conductor configured to generate substantially no heat.

3252. The system of claim 3246, further comprising a lead-in conductor coupled to the insulated conductor, wherein the lead-in conductor comprises a rubber insulated conductor.

3253. The system of claim 3246, further comprising a lead-in conductor coupled to the insulated conductor, wherein the lead-in conductor comprises a copper wire.

3254. The system of claim 3246, further comprising a lead-in conductor coupled to the insulated conductor with a cold pin transition conductor.

3255. The system of claim 3246, further comprising a lead-in conductor coupled to the insulated conductor with a cold pin transition conductor, wherein the cold pin transition conductor comprises a substantially low resistance insulated conductor.

3256. The system of claim 3246, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the electrically insulating material is disposed in a sheath.

3257. The system of claim 3246, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the conductor comprises a copper-nickel alloy.

3258. The system of claim 3246, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the conductor comprises a copper-nickel alloy, and wherein the copper-nickel alloy comprises approximately 7 % nickel by weight to approximately 12 % nickel by weight.

3259. The system of claim 3246, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the conductor comprises a copper-nickel alloy, and wherein the copper-nickel alloy comprises approximately 2 % nickel by weight to approximately 6 % nickel by weight.

3260. The system of claim 3246, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the electrically insulating material comprises a thermally conductive material.

3261. The system of claim 3246, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the electrically insulating material comprises magnesium oxide.

3262. The system of claim 3246, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, and wherein the magnesium oxide comprises a thickness of at least approximately 1 mm.

3263. The system of claim 3246, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the electrically insulating material comprises aluminum oxide and magnesium oxide.

3264. The system of claim 3246, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, wherein the magnesium oxide comprises grain particles, and wherein the grain particles are configured to occupy porous spaces within the magnesium oxide.

3265. The system of claim 3246, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the electrically insulating material is disposed in a sheath, and wherein the sheath comprises a corrosion-resistant material.

3266. The system of claim 3246, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the electrically insulating material is disposed in a sheath, and wherein the sheath comprises stainless steel.

3267. The system of claim 3246, further comprising two additional insulated conductors, wherein the insulated conductor and the two additional insulated conductors are configured in a 3-phase Y configuration.

3268. The system of claim 3246, further comprising an additional insulated conductor, wherein the insulated conductor and the additional insulated conductor are coupled to a support member, and wherein the insulated conductor and the additional insulated conductor are configured in a series electrical configuration.

3269. The system of claim 3246, further comprising an additional insulated conductor, wherein the insulated conductor and the additional insulated conductor are coupled to a support member, and wherein the insulated conductor and the additional insulated conductor are configured in a parallel electrical configuration.

3270. The system of claim 3246, wherein the insulated conductor is configured to generate radiant heat of approximately 500 W/m to approximately 1150 W/m during use.

3271. The system of claim 3246, further comprising a support member configured to support the insulated conductor, wherein the support member comprises orifices configured to provide fluid flow through the support member into the open wellbore during use.

3272. The system of claim 3246, further comprising a support member configured to support the insulated conductor, wherein the support member comprises critical flow orifices configured to provide a substantially constant amount of fluid flow through the support member into the open wellbore during use.

3273. The system of claim 3246, further comprising a tube coupled to the insulated conductor, wherein the tube is configured to provide a flow of fluid into the open wellbore during use.

3274. The system of claim 3246, further comprising a tube coupled to the insulated conductor, wherein the tube comprises critical flow orifices configured to provide a substantially constant amount of fluid flow through the support member into the open wellbore during use.

3275. The system of claim 3246, further comprising an overburden casing coupled to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation.

3276. The system of claim 3246, further comprising an overburden casing coupled to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3277. The system of claim 3246, further comprising an overburden casing coupled to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3278. The system of claim 3246, further comprising an overburden casing coupled to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the open wellbore.

3279. The system of claim 3246, further comprising an overburden casing coupled to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the open wellbore, and wherein the packing material is configured to substantially inhibit a flow of fluid between the open wellbore and the overburden casing during use.

3280. The system of claim 3246, further comprising an overburden casing coupled to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the open wellbore, and wherein the packing material comprises cement.

3281. The system of claim 3246, further comprising an overburden casing coupled to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation, the system further comprising a wellhead coupled to the overburden casing and a lead-in conductor coupled to the insulated conductor, wherein the wellhead is disposed external to the overburden, wherein the wellhead comprises at least one sealing flange, and wherein at least the one sealing flange is configured to couple to the lead-in conductor.

3282. The system of claim 3246, wherein the system is further configured to transfer heat such that the transferred heat can pyrolyze at least some of the hydrocarbons in the selected section.

3283. A system configurable to heat a coal formation, comprising:

an insulated conductor configurable to be disposed within an open wellbore in the formation, wherein the insulated conductor is further configurable to provide radiant heat to at least a portion of the formation during use; and

wherein the system is configurable to allow heat to transfer from the insulated conductor to a selected section of the formation during use.

3284. The system of claim 3283, wherein the insulated conductor is further configurable to generate heat during application of an electrical current to the insulated conductor during use.

3285. The system of claim 3283, further comprising a support member, wherein the support member is configurable to support the insulated conductor.

3286. The system of claim 3283, further comprising a support member and a centralizer, wherein the support member is configurable to support the insulated conductor, and wherein the centralizer is configurable to maintain a location of the insulated conductor on the support member.

3287. The system of claim 3283, wherein the open wellbore comprises a diameter of at least approximately 5 cm.

3288. The system of claim 3283, further comprising a lead-in conductor coupled to the insulated conductor, wherein the lead-in conductor comprises a low resistance conductor configurable to generate substantially no heat.

3289. The system of claim 3283, further comprising a lead-in conductor coupled to the insulated conductor, wherein the lead-in conductor comprises a rubber insulated conductor.

3290. The system of claim 3283, further comprising a lead-in conductor coupled to the insulated conductor, wherein the lead-in conductor comprises a copper wire.

3291. The system of claim 3283, further comprising a lead-in conductor coupled to the insulated conductor with a cold pin transition conductor.

3292. The system of claim 3283, further comprising a lead-in conductor coupled to the insulated conductor with a cold pin transition conductor, wherein the cold pin transition conductor comprises a substantially low resistance insulated conductor.

3293. The system of claim 3283, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the electrically insulating material is disposed in a sheath.

3294. The system of claim 3283, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the conductor comprises a copper-nickel alloy.

3295. The system of claim 3283, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the conductor comprises a copper-nickel alloy, and wherein the copper-nickel alloy comprises approximately 7 % nickel by weight to approximately 12 % nickel by weight.

3296. The system of claim 3283, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the conductor comprises a copper-nickel alloy, and wherein the copper-nickel alloy comprises approximately 2 % nickel by weight to approximately 6 % nickel by weight.

3297. The system of claim 3283, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the electrically insulating material comprises a thermally conductive material.

3298. The system of claim 3283, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the electrically insulating material comprises magnesium oxide.

3299. The system of claim 3283, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, and wherein the magnesium oxide comprises a thickness of at least approximately 1 mm.

3300. The system of claim 3283, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the electrically insulating material comprises aluminum oxide and magnesium oxide.

3301. The system of claim 3283, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, wherein the magnesium oxide comprises grain particles, and wherein the grain particles are configurable to occupy porous spaces within the magnesium oxide.

3302. The system of claim 3283, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the electrically insulating material is disposed in a sheath, and wherein the sheath comprises a corrosion-resistant material.

3303. The system of claim 3283, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the electrically insulating material is disposed in a sheath, and wherein the sheath comprises stainless steel.

3304. The system of claim 3283, further comprising two additional insulated conductors, wherein the insulated conductor and the two additional insulated conductors are configurable in a 3-phase Y configuration.

3305. The system of claim 3283, further comprising an additional insulated conductor, wherein the insulated conductor and the additional insulated conductor are coupled to a support member, and wherein the insulated conductor and the additional insulated conductor are configurable in a series electrical configuration.

3306. The system of claim 3283, further comprising an additional insulated conductor, wherein the insulated conductor and the additional insulated conductor are coupled to a support member, and wherein the insulated conductor and the additional insulated conductor are configurable in a parallel electrical configuration.

3307. The system of claim 3283, wherein the insulated conductor is configurable to generate radiant heat of approximately 500 W/m to approximately 1150 W/m during use.

3308. The system of claim 3283, further comprising a support member configurable to support the insulated conductor, wherein the support member comprises orifices configurable to provide fluid flow through the support member into the open wellbore during use.

3309. The system of claim 3283, further comprising a support member configurable to support the insulated conductor, wherein the support member comprises critical flow orifices configurable to provide a substantially constant amount of fluid flow through the support member into the open wellbore during use.

3310. The system of claim 3283, further comprising a tube coupled to the insulated conductor, wherein the tube is configurable to provide a flow of fluid into the open wellbore during use.

3311. The system of claim 3283, further comprising a tube coupled to the first insulated conductor, wherein the tube comprises critical flow orifices configurable to provide a

substantially constant amount of fluid flow through the support member into the open wellbore during use.

3312. The system of claim 3283, further comprising an overburden casing coupled to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation.

3313. The system of claim 3283, further comprising an overburden casing coupled to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation. and wherein the overburden casing comprises steel.

3314. The system of claim 3283, further comprising an overburden casing coupled to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3315. The system of claim 3283, further comprising an overburden casing coupled to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the open wellbore.

3316. The system of claim 3283, further comprising an overburden casing coupled to the open wellbore. wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the open wellbore, and wherein the packing material is configurable to substantially inhibit a flow of fluid between the open wellbore and the overburden casing during use.

3317. The system of claim 3283, further comprising an overburden casing coupled to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the open wellbore, and wherein the packing material comprises cement.

3318. The system of claim 3283, further comprising an overburden casing coupled to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation, the system further comprising a wellhead coupled to the overburden casing and a lead-in conductor coupled to the insulated conductor, wherein the wellhead is disposed external to the overburden, wherein the wellhead comprises at least one sealing flange, and wherein at least the one sealing flange is configurable to couple to the lead-in conductor.

3319. The system of claim 3283, wherein the system is further configured to transfer heat such that the transferred heat can pyrolyze at least some hydrocarbons in the selected section.

3320. An in situ method for heating a coal formation, comprising:

applying an electrical current to an insulated conductor to provide radiant heat to at least a portion of the formation, wherein the insulated conductor is disposed within an open wellbore in the formation; and

allowing the radiant heat to transfer from the insulated conductor to a selected section of the formation.

3321. The method of claim 3320, further comprising supporting the insulated conductor on a support member.

3322. The method of claim 3320, further comprising supporting the insulated conductor on a support member and maintaining a location of the insulated conductor on the support member with a centralizer.

3323. The method of claim 3320, wherein the insulated conductor is coupled to two additional insulated conductors, wherein the insulated conductor and the two insulated conductors are disposed within the open wellbore, and wherein the three insulated conductors are electrically coupled in a 3-phase Y configuration.

3324. The method of claim 3320, wherein an additional insulated conductor is disposed within the open wellbore.

3325. The method of claim 3320, wherein an additional insulated conductor is disposed within the open wellbore, and wherein the insulated conductor and the additional insulated conductor are electrically coupled in a series configuration.

3326. The method of claim 3320, wherein an additional insulated conductor is disposed within the open wellbore, and wherein the insulated conductor and the additional insulated conductor are electrically coupled in a parallel configuration.

3327. The method of claim 3320, wherein the provided heat comprises approximately 500 W/m to approximately 1150 W/m.

3328. The method of claim 3320, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the conductor comprises a copper-nickel alloy.

3329. The method of claim 3320, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the conductor comprises a copper-nickel alloy, and wherein the copper-nickel alloy comprises approximately 7 % nickel by weight to approximately 12 % nickel by weight.

3330. The method of claim 3320, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the conductor comprises a copper-nickel alloy, and wherein the copper-nickel alloy comprises approximately 2 % nickel by weight to approximately 6 % nickel by weight.

3331. The method of claim 3320, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the electrically insulating material comprises magnesium oxide.

3332. The method of claim 3320, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, and wherein the magnesium oxide comprises a thickness of at least approximately 1 mm.

3333. The method of claim 3320, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the electrically insulating material comprises aluminum oxide and magnesium oxide.

3334. The method of claim 3320, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, wherein the magnesium oxide comprises grain particles, and wherein the grain particles are configured to occupy porous spaces within the magnesium oxide.

3335. The method of claim 3320, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the insulating material is disposed in a sheath, and wherein the sheath comprises a corrosion-resistant material.

3336. The method of claim 3320, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the insulating material is disposed in a sheath, and wherein the sheath comprises stainless steel.

3337. The method of claim 3320, further comprising supporting the insulated conductor on a support member and flowing a fluid into the open wellbore through an orifice in the support member.

3338. The method of claim 3320, further comprising supporting the insulated conductor on a support member and flowing a substantially constant amount of fluid into the open wellbore through critical flow orifices in the support member.

3339. The method of claim 3320, wherein a perforated tube is disposed in the open wellbore proximate to the insulated conductor, the method further comprising flowing a fluid into the open wellbore through the perforated tube.

3340. The method of claim 3320, wherein a tube is disposed in the open wellbore proximate to the insulated conductor, the method further comprising flowing a substantially constant amount a fluid into the open wellbore through critical flow orifices in the tube.

3341. The method of claim 3320, further comprising supporting the insulated conductor on a support member and flowing a corrosion inhibiting fluid into the open wellbore through an orifice in the support member.

3342. The method of claim 3320, wherein a perforated tube is disposed in the open wellbore proximate to the insulated conductor, the method further comprising flowing a corrosion inhibiting fluid into the open wellbore through the perforated tube.

3343. The method of claim 3320, further comprising determining a temperature distribution in the insulated conductor using an electromagnetic signal provided to the insulated conductor.

3344. The method of claim 3320, further comprising monitoring a leakage current of the insulated conductor.

3345. The method of claim 3320, further comprising monitoring the applied electrical current.

3346. The method of claim 3320, further comprising monitoring a voltage applied to the insulated conductor.

3347. The method of claim 3320, further comprising monitoring a temperature in the insulated conductor with at least one thermocouple.

3348. The method of claim 3320, further comprising electrically coupling a lead-in conductor to the insulated conductor, wherein the lead-in conductor comprises a low resistance conductor configured to generate substantially no heat.

3349. The method of claim 3320, further comprising electrically coupling a lead-in conductor to the insulated conductor using a cold pin transition conductor.

3350. The method of claim 3320, further comprising electrically coupling a lead-in conductor to the insulated conductor using a cold pin transition conductor, wherein the cold pin transition conductor comprises a substantially low resistance insulated conductor.

3351. The method of claim 3320, further comprising coupling an overburden casing to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation.

3352. The method of claim 3320, further comprising coupling an overburden casing to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3353. The method of claim 3320, further comprising coupling an overburden casing to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3354. The method of claim 3320, further comprising coupling an overburden casing to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the open wellbore.

3355. The method of claim 3320, further comprising coupling an overburden casing to the open wellbore, wherein the overburden casing is disposed in an overburden of the formation, and wherein the method further comprises inhibiting a flow of fluid between the open wellbore and the overburden casing with a packing material.

3356. The method of claim 3320, further comprising heating at least the portion of the formation to pyrolyze at least some hydrocarbons within the formation.

3357. An in situ method for heating a coal formation, comprising:

applying an electrical current to an insulated conductor to provide heat to at least a portion of the formation, wherein the insulated conductor is disposed within an opening in the formation; and

allowing the heat to transfer from the insulated conductor to a section of the formation.

3358. The method of claim 3357, further comprising supporting the insulated conductor on a support member.

3359. The method of claim 3357, further comprising supporting the insulated conductor on a support member and maintaining a location of the first insulated conductor on the support member with a centralizer.

3360. The method of claim 3357, wherein the insulated conductor is coupled to two additional insulated conductors, wherein the insulated conductor and the two insulated conductors are disposed within the opening, and wherein the three insulated conductors are electrically coupled in a 3-phase Y configuration.

3361. The method of claim 3357, wherein an additional insulated conductor is disposed within the opening.

3362. The method of claim 3357, wherein an additional insulated conductor is disposed within the opening, and wherein the insulated conductor and the additional insulated conductor are electrically coupled in a series configuration.

3363. The method of claim 3357, wherein an additional insulated conductor is disposed within the opening, and wherein the insulated conductor and the additional insulated conductor are electrically coupled in a parallel configuration.

3364. The method of claim 3357, wherein the provided heat comprises approximately 500 W/m to approximately 1150 W/m.

3365. The method of claim 3357, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the conductor comprises a copper-nickel alloy.

3366. The method of claim 3357, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the conductor comprises a copper-nickel alloy, and wherein the copper-nickel alloy comprises approximately 7 % nickel by weight to approximately 12 % nickel by weight.

3367. The method of claim 3357, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the conductor comprises a copper-nickel alloy, and wherein the copper-nickel alloy comprises approximately 2 % nickel by weight to approximately 6 % nickel by weight.

3368. The method of claim 3357, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the electrically insulating material comprises magnesium oxide.

3369. The method of claim 3357, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the electrically

insulating material comprises magnesium oxide, and wherein the magnesium oxide comprises a thickness of at least approximately 1 mm.

3370. The method of claim 3357, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, and wherein the electrically insulating material comprises aluminum oxide and magnesium oxide.

3371. The method of claim 3357, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, wherein the magnesium oxide comprises grain particles, and wherein the grain particles are configured to occupy porous spaces within the magnesium oxide.

3372. The method of claim 3357, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the insulating material is disposed in a sheath, and wherein the sheath comprises a corrosion-resistant material.

3373. The method of claim 3357, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the insulating material is disposed in a sheath, and wherein the sheath comprises stainless steel.

3374. The method of claim 3357, further comprising supporting the insulated conductor on a support member and flowing a fluid into the opening through an orifice in the support member.

3375. The method of claim 3357, further comprising supporting the insulated conductor on a support member and flowing a substantially constant amount of fluid into the opening through critical flow orifices in the support member.

3376. The method of claim 3357, wherein a perforated tube is disposed in the opening proximate to the insulated conductor, the method further comprising flowing a fluid into the opening through the perforated tube.

3377. The method of claim 3357, wherein a tube is disposed in the opening proximate to the insulated conductor, the method further comprising flowing a substantially constant amount a fluid into the opening through critical flow orifices in the tube.

3378. The method of claim 3357, further comprising supporting the insulated conductor on a support member and flowing a corrosion inhibiting fluid into the opening through an orifice in the support member.

3379. The method of claim 3357, wherein a perforated tube is disposed in the opening proximate to the insulated conductor, the method further comprising flowing a corrosion inhibiting fluid into the opening through the perforated tube.

3380. The method of claim 3357, further comprising determining a temperature distribution in the insulated conductor using an electromagnetic signal provided to the insulated conductor.

3381. The method of claim 3357, further comprising monitoring a leakage current of the insulated conductor.

3382. The method of claim 3357, further comprising monitoring the applied electrical current.

3383. The method of claim 3357, further comprising monitoring a voltage applied to the insulated conductor.

3384. The method of claim 3357, further comprising monitoring a temperature in the insulated conductor with at least one thermocouple.

3385. The method of claim 3357, further comprising electrically coupling a lead-in conductor to the insulated conductor, wherein the lead-in conductor comprises a low resistance conductor configured to generate substantially no heat.

3386. The method of claim 3357, further comprising electrically coupling a lead-in conductor to the insulated conductor using a cold pin transition conductor.

3387. The method of claim 3357, further comprising electrically coupling a lead-in conductor to the insulated conductor using a cold pin transition conductor, wherein the cold pin transition conductor comprises a substantially low resistance insulated conductor.

3388. The method of claim 3357, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3389. The method of claim 3357, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3390. The method of claim 3357, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3391. The method of claim 3357, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3392. The method of claim 3357, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation. and wherein the method further comprises inhibiting a flow of fluid between the opening and the overburden casing with a packing material.

3393. The method of claim 3357, further comprising heating at least the portion of the formation to substantially pyrolyze at least some hydrocarbons within the formation.

3394. A system configured to heat a coal formation, comprising:

an insulated conductor disposed within an opening in the formation, wherein the insulated conductor is configured to provide heat to at least a portion of the formation during use, wherein the insulated conductor comprises a copper-nickel alloy, and wherein the copper-nickel alloy comprises approximately 7 % nickel by weight to approximately 12 % nickel by weight; and

wherein the system is configured to allow heat to transfer from the insulated conductor to a selected section of the formation during use.

3395. The system of claim 3394, wherein the insulated conductor is further configured to generate heat during application of an electrical current to the insulated conductor during use.

3396. The system of claim 3394, further comprising a support member, wherein the support member is configured to support the insulated conductor.

3397. The system of claim 3394, further comprising a support member and a centralizer, wherein the support member is configured to support the insulated conductor, and wherein the centralizer is configured to maintain a location of the insulated conductor on the support member.

3398. The system of claim 3394, wherein the opening comprises a diameter of at least approximately 5 cm.

3399. The system of claim 3394, further comprising a lead-in conductor coupled to the insulated conductor, wherein the lead-in conductor comprises a low resistance conductor configured to generate substantially no heat.

3400. The system of claim 3394, further comprising a lead-in conductor coupled to the insulated conductor, wherein the lead-in conductor comprises a rubber insulated conductor.

3401. The system of claim 3394, further comprising a lead-in conductor coupled to the insulated conductor, wherein the lead-in conductor comprises a copper wire.

3402. The system of claim 3394, further comprising a lead-in conductor coupled to the insulated conductor with a cold pin transition conductor.

3403. The system of claim 3394, further comprising a lead-in conductor coupled to the insulated conductor with a cold pin transition conductor, wherein the cold pin transition conductor comprises a substantially low resistance insulated conductor.

3404. The system of claim 3394, wherein the copper-nickel alloy is disposed in an electrically insulating material, and wherein the electrically insulating material comprises a thermally conductive material.

3405. The system of claim 3394, wherein the copper-nickel alloy is disposed in an electrically insulating material, and wherein the electrically insulating material comprises magnesium oxide.

3406. The system of claim 3394, wherein the copper-nickel alloy is disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, and wherein the magnesium oxide comprises a thickness of at least approximately 1 mm.

3407. The system of claim 3394, wherein the copper-nickel alloy is disposed in an electrically insulating material, and wherein the electrically insulating material comprises aluminum oxide and magnesium oxide.

3408. The system of claim 3394, wherein the copper-nickel alloy is disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, wherein the magnesium oxide comprises grain particles, and wherein the grain particles are configured to occupy porous spaces within the magnesium oxide.

3409. The system of claim 3394, wherein the copper-nickel alloy is disposed in an electrically insulating material, wherein the electrically insulating material is disposed in a sheath, and wherein the sheath comprises a corrosion-resistant material.

3410. The system of claim 3394, wherein the copper-nickel alloy is disposed in an electrically insulating material, wherein the electrically insulating material is disposed in a sheath, and wherein the sheath comprises stainless steel.

3411. The system of claim 3394, further comprising two additional insulated conductors, wherein the insulated conductor and the two additional insulated conductors are configured in a 3-phase Y configuration.

3412. The system of claim 3394, further comprising an additional insulated conductor, wherein the insulated conductor and the additional insulated conductor are coupled to a support member, and wherein the insulated conductor and the additional insulated conductor are configured in a series electrical configuration.

3413. The system of claim 3394, further comprising an additional insulated conductor, wherein the insulated conductor and the additional insulated conductor are coupled to a support member, and wherein the insulated conductor and the additional insulated conductor are configured in a parallel electrical configuration.

3414. The system of claim 3394, wherein the insulated conductor is configured to generate radiant heat of approximately 500 W/m to approximately 1150 W/m during use.

3415. The system of claim 3394, further comprising a support member configured to support the insulated conductor, wherein the support member comprises orifices configured to provide fluid flow through the support member into the opening during use.

3416. The system of claim 3394, further comprising a support member configured to support the insulated conductor, wherein the support member comprises critical flow orifices configured to provide a substantially constant amount of fluid flow through the support member into the opening during use.

3417. The system of claim 3394, further comprising a tube coupled to the insulated conductor, wherein the tube is configured to provide a flow of fluid into the opening during use.

3418. The system of claim 3394, further comprising a tube coupled to the insulated conductor, wherein the tube comprises critical flow orifices configured to provide a substantially constant amount of fluid flow through the support member into the opening during use.

3419. The system of claim 3394, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3420. The system of claim 3394, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3421. The system of claim 3394, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3422. The system of claim 3394, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3423. The system of claim 3394, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is configured to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3424. The system of claim 3394, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

3425. The system of claim 3394, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, the system further comprising a wellhead coupled to the overburden casing and a lead-in conductor coupled to the insulated conductor, wherein the wellhead is disposed external to the overburden, wherein the wellhead comprises at least one sealing flange, and wherein at least the one sealing flange is configured to couple to the lead-in conductor.

3426. The system of claim 3394, wherein the system is further configured to transfer heat such that the transferred heat can pyrolyze at least some hydrocarbons in the selected section.

3427. A system configurable to heat a coal formation, comprising:

an insulated conductor configurable to be disposed within an opening in the formation, wherein the insulated conductor is further configurable to provide heat to at least a portion of the formation during use, wherein the insulated conductor comprises a copper-nickel alloy, and wherein the copper-nickel alloy comprises approximately 7 % nickel by weight to approximately 12 % nickel by weight;

wherein the system is configurable to allow heat to transfer from the insulated conductor to a selected section of the formation during use.

3428. The system of claim 3427, wherein the insulated conductor is further configurable to generate heat during application of an electrical current to the insulated conductor during use.

3429. The system of claim 3427, further comprising a support member, wherein the support member is configurable to support the insulated conductor.

3430. The system of claim 3427, further comprising a support member and a centralizer, wherein the support member is configurable to support the insulated conductor, and wherein the centralizer is configurable to maintain a location of the insulated conductor on the support member.

3431. The system of claim 3427, wherein the opening comprises a diameter of at least approximately 5 cm.

3432. The system of claim 3427, further comprising a lead-in conductor coupled to the insulated conductor, wherein the lead-in conductor comprises a low resistance conductor configurable to generate substantially no heat.

3433. The system of claim 3427, further comprising a lead-in conductor coupled to the insulated conductor, wherein the lead-in conductor comprises a rubber insulated conductor.

3434. The system of claim 3427, further comprising a lead-in conductor coupled to the insulated conductor, wherein the lead-in conductor comprises a copper wire.

3435. The system of claim 3427, further comprising a lead-in conductor coupled to the insulated conductor with a cold pin transition conductor.

3436. The system of claim 3427, further comprising a lead-in conductor coupled to the insulated conductor with a cold pin transition conductor, wherein the cold pin transition conductor comprises a substantially low resistance insulated conductor.

3437. The system of claim 3427, wherein the copper-nickel alloy is disposed in an electrically insulating material, and wherein the electrically insulating material comprises a thermally conductive material.

3438. The system of claim 3427, wherein the copper-nickel alloy is disposed in an electrically insulating material, and wherein the electrically insulating material comprises magnesium oxide.

3439. The system of claim 3427, wherein the copper-nickel alloy is disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, and wherein the magnesium oxide comprises a thickness of at least approximately 1 mm.

3440. The system of claim 3427, wherein the copper-nickel alloy is disposed in an electrically insulating material, and wherein the electrically insulating material comprises aluminum oxide and magnesium oxide.

3441. The system of claim 3427. wherein the copper-nickel alloy is disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, wherein the magnesium oxide comprises grain particles, and wherein the grain particles are configurable to occupy porous spaces within the magnesium oxide.

3442. The system of claim 3427, wherein the copper-nickel alloy is disposed in an electrically insulating material. wherein the electrically insulating material is disposed in a sheath. and wherein the sheath comprises a corrosion-resistant material.

3443. The system of claim 3427, wherein the copper-nickel alloy is disposed in an electrically insulating material, wherein the electrically insulating material is disposed in a sheath, and wherein the sheath comprises stainless steel.

3444. The system of claim 3427, further comprising two additional insulated conductors, wherein the insulated conductor and the two additional insulated conductors are configurable in a 3-phase Y configuration.

3445. The system of claim 3427, further comprising an additional insulated conductor, wherein the insulated conductor and the additional insulated conductor are coupled to a support member, and wherein the insulated conductor and the additional insulated conductor are configurable in a series electrical configuration.

3446. The system of claim 3427, further comprising an additional insulated conductor, wherein the insulated conductor and the additional insulated conductor are coupled to a support member, and wherein the insulated conductor and the additional insulated conductor are configurable in a parallel electrical configuration.

3447. The system of claim 3427, wherein the insulated conductor is configurable to generate radiant heat of approximately 500 W/m to approximately 1150 W/m during use.

3448. The system of claim 3427, further comprising a support member configurable to support the insulated conductor, wherein the support member comprises orifices configurable to provide fluid flow through the support member into the open wellbore during use.

3449. The system of claim 3427, further comprising a support member configurable to support the insulated conductor, wherein the support member comprises critical flow orifices configurable to provide a substantially constant amount of fluid flow through the support member into the opening during use.

3450. The system of claim 3427, further comprising a tube coupled to the insulated conductor, wherein the tube is configurable to provide a flow of fluid into the opening during use.

3451. The system of claim 3427, further comprising a tube coupled to the insulated conductor, wherein the tube comprises critical flow orifices configurable to provide a substantially constant amount of fluid flow through the support member into the opening during use.

3452. The system of claim 3427, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3453. The system of claim 3427, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3454. The system of claim 3427, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3455. The system of claim 3427, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3456. The system of claim 3427. further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is configurable to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3457. The system of claim 3427, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

3458. The system of claim 3427, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, the system further comprising a wellhead coupled to the overburden casing and a lead-in conductor coupled to the insulated conductor, wherein the wellhead is disposed external to the overburden, wherein the wellhead comprises at least one sealing flange, and wherein at least the one sealing flange is configurable to couple to the lead-in conductor.

3459. The system of claim 3427, wherein the system is further configured to transfer heat such that the transferred heat can pyrolyze at least some hydrocarbons in the selected section.

3460. An in situ method for heating a coal formation, comprising:

applying an electrical current to an insulated conductor to provide heat to at least a portion of the formation, wherein the insulated conductor is disposed within an opening

in the formation, and wherein the insulated conductor comprises a copper-nickel alloy of approximately 7 % nickel by weight to approximately 12 % nickel by weight; and

allowing the heat to transfer from the insulated conductor to a selected section of the formation.

3461. The method of claim 3460, further comprising supporting the insulated conductor on a support member.

3462. The method of claim 3460, further comprising supporting the insulated conductor on a support member and maintaining a location of the first insulated conductor on the support member with a centralizer.

3463. The method of claim 3460, wherein the insulated conductor is coupled to two additional insulated conductors, wherein the insulated conductor and the two insulated conductors are disposed within the opening, and wherein the three insulated conductors are electrically coupled in a 3-phase Y configuration.

3464. The method of claim 3460, wherein an additional insulated conductor is disposed within the opening.

3465. The method of claim 3460, wherein an additional insulated conductor is disposed within the opening, and wherein the insulated conductor and the additional insulated conductor are electrically coupled in a series configuration.

3466. The method of claim 3460, wherein an additional insulated conductor is disposed within the opening, and wherein the insulated conductor and the additional insulated conductor are electrically coupled in a parallel configuration.

3467. The method of claim 3460, wherein the provided heat comprises approximately 500 W/m to approximately 1150 W/m.

3468. The method of claim 3460, wherein the copper-nickel alloy is disposed in an electrically insulating material.

3469. The method of claim 3460, wherein the copper-nickel alloy is disposed in an electrically insulating material, and wherein the electrically insulating material comprises magnesium oxide.

3470. The method of claim 3460, wherein the copper-nickel alloy is disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, and wherein the magnesium oxide comprises a thickness of at least approximately 1 mm.

3471. The method of claim 3460, wherein the copper-nickel alloy is disposed in an electrically insulating material, and wherein the electrically insulating material comprises aluminum oxide and magnesium oxide.

3472. The method of claim 3460, wherein the copper-nickel alloy is disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, wherein the magnesium oxide comprises grain particles, and wherein the grain particles are configured to occupy porous spaces within the magnesium oxide.

3473. The method of claim 3460, wherein the copper-nickel alloy is disposed in an electrically insulating material, wherein the insulating material is disposed in a sheath, and wherein the sheath comprises a corrosion-resistant material.

3474. The method of claim 3460, wherein the copper-nickel alloy is disposed in an electrically insulating material, wherein the insulating material is disposed in a sheath, and wherein the sheath comprises stainless steel.

3475. The method of claim 3460, further comprising supporting the insulated conductor on a support member and flowing a fluid into the opening through an orifice in the support member.

3476. The method of claim 3460, further comprising supporting the insulated conductor on a support member and flowing a substantially constant amount of fluid into the opening through critical flow orifices in the support member.

3477. The method of claim 3460, wherein a perforated tube is disposed in the opening proximate to the insulated conductor, the method further comprising flowing a fluid into the opening through the perforated tube.

3478. The method of claim 3460, wherein a tube is disposed in the opening proximate to the insulated conductor, the method further comprising flowing a substantially constant amount a fluid into the opening through critical flow orifices in the tube.

3479. The method of claim 3460, further comprising supporting the insulated conductor on a support member and flowing a corrosion inhibiting fluid into the opening through an orifice in the support member.

3480. The method of claim 3460, wherein a perforated tube is disposed in the opening proximate to the insulated conductor, the method further comprising flowing a corrosion inhibiting fluid into the opening through the perforated tube.

3481. The method of claim 3460, further comprising determining a temperature distribution in the insulated conductor using an electromagnetic signal provided to the insulated conductor.

3482. The method of claim 3460, further comprising monitoring a leakage current of the insulated conductor.

3483. The method of claim 3460, further comprising monitoring the applied electrical current.

3484. The method of claim 3460,. further comprising monitoring a voltage applied to the insulated conductor.

3485. The method of claim 3460, further comprising monitoring a temperature in the insulated conductor with at least one thermocouple.

3486. The method of claim 3460, further comprising electrically coupling a lead-in conductor to the insulated conductor, wherein the lead-in conductor comprises a low resistance conductor configured to generate substantially no heat.

3487. The method of claim 3460, further comprising electrically coupling a lead-in conductor to the insulated conductor using a cold pin transition conductor.

3488. The method of claim 3460. further comprising electrically coupling a lead-in conductor to the insulated conductor using a cold pin transition conductor. wherein the cold pin transition conductor comprises a substantially low resistance insulated conductor.

3489. The method of claim 3460, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3490. The method of claim 3460, further comprising coupling an overburden casing to the opening. wherein the overburden casing is disposed in an overburden of the formation. and wherein the overburden casing comprises steel.

3491. The method of claim 3460, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3492. The method of claim 3460, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3493. The method of claim 3460, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the method further comprises inhibiting a flow of fluid between the opening and the overburden casing with a packing material.

3494. The method of claim 3460, further comprising heating at least the portion of the formation to substantially pyrolyze at least some hydrocarbons within the formation.

3495. A system configured to heat a coal formation, comprising:

at least three insulated conductors disposed within an opening in the formation, wherein at least the three insulated conductors are electrically coupled in a 3-phase Y configuration, and wherein at least the three insulated conductors are configured to provide heat to at least a portion of the formation during use; and

wherein the system is configured to allow heat to transfer from at least the three insulated conductors to a selected section of the formation during use.

3496. The system of claim 3495, wherein at least the three insulated conductors are further configured to generate heat during application of an electrical current to at least the three insulated conductors during use.

3497. The system of claim 3495, further comprising a support member, wherein the support member is configured to support at least the three insulated conductors.

3498. The system of claim 3495, further comprising a support member and a centralizer, wherein the support member is configured to support at least the three insulated conductors, and wherein the centralizer is configured to maintain a location of at least the three insulated conductors on the support member.

3499. The system of claim 3495, wherein the opening comprises a diameter of at least approximately 5 cm.

3500. The system of claim 3495, further comprising at least one lead-in conductor coupled to at least the three insulated conductors, wherein at least the one lead-in conductor comprises a low resistance conductor configured to generate substantially no heat.

3501. The system of claim 3495, further comprising at least one lead-in conductor coupled to at least the three insulated conductors, wherein at least the one lead-in conductor comprises a rubber insulated conductor.

3502. The system of claim 3495, further comprising at least one lead-in conductor coupled to at least the three insulated conductors, wherein at least the one lead-in conductor comprises a copper wire.

3503. The system of claim 3495, further comprising at least one lead-in conductor coupled to at least the three insulated conductors with a cold pin transition conductor.

3504. The system of claim 3495, further comprising at least one lead-in conductor coupled to at least the three insulated conductors with a cold pin transition conductor, wherein the cold pin transition conductor comprises a substantially low resistance insulated conductor.

3505. The system of claim 3495, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, and wherein the electrically insulating material is disposed in a sheath.

3506. The system of claim 3495, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, and wherein the conductor comprises a copper-nickel alloy.

3507. The system of claim 3495, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, wherein the conductor comprises a copper-nickel alloy, and wherein the copper-nickel alloy comprises approximately 7 % nickel by weight to approximately 12 % nickel by weight.

3508. The system of claim 3495, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, wherein the conductor comprises a copper-nickel alloy, and wherein the copper-nickel alloy comprises approximately 2 % nickel by weight to approximately 6 % nickel by weight.

3509. The system of claim 3495, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, and wherein the electrically insulating material comprises a thermally conductive material.

3510. The system of claim 3495, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, and wherein the electrically insulating material comprises magnesium oxide.

3511. The system of claim 3495, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, and wherein the magnesium oxide comprises a thickness of at least approximately 1 mm.

3512. The system of claim 3495. wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, and wherein the electrically insulating material comprises aluminum oxide and magnesium oxide.

3513. The system of claim 3495, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, wherein the magnesium oxide comprises grain particles, and wherein the grain particles are configured to occupy porous spaces within the magnesium oxide.

3514. The system of claim 3495, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, and wherein the electrically insulating material is disposed in a sheath, and wherein the sheath comprises a corrosion-resistant material.

3515. The system of claim 3495, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, and wherein the electrically insulating material is disposed in a sheath. and wherein the sheath comprises stainless steel.

3516. The system of claim 3495, wherein at least the three insulated conductors are configured to generate radiant heat of approximately 500 W/m to approximately 1150 W/m of at least the three insulated conductors during use.

3517. The system of claim 3495, further comprising a support member configured to support at least the three insulated conductors. wherein the support member comprises orifices configured to provide fluid flow through the support member into the opening during use.

3518. The system of claim 3495, further comprising a support member configured to support at least the three insulated conductors, wherein the support member comprises

critical flow orifices configured to provide a substantially constant amount of fluid flow through the support member into the opening during use.

3519. The system of claim 3495, further comprising a tube coupled to at least the three insulated conductors, wherein the tube is configured to provide a flow of fluid into the opening during use.

3520. The system of claim 3495, further comprising a tube coupled to at least the three insulated conductors, wherein the tube comprises critical flow orifices configured to provide a substantially constant amount of fluid flow through the support member into the opening during use.

3521. The system of claim 3495, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3522. The system of claim 3495, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3523. The system of claim 3495, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3524. The system of claim 3495, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3525. The system of claim 3495, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the

formation. wherein a packing material is disposed at a junction of the overburden casing and the opening. and wherein the packing material is configured to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3526. The system of claim 3495, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

3527. The system of claim 3495, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, the system further comprising a wellhead coupled to the overburden casing and a lead-in conductor coupled to the insulated conductor, wherein the wellhead is disposed external to the overburden, wherein the wellhead comprises at least one sealing flange, and wherein at least the one sealing flange is configured to couple to the lead-in conductor.

3528. The system of claim 3495, wherein the system is further configured to transfer heat such that the transferred heat can pyrolyze at least some hydrocarbons in the selected section.

3529. A system configurable to heat a coal formation. comprising:

at least three insulated conductors configurable to be disposed within an opening in the formation, wherein at least the three insulated conductors are electrically coupled in a 3-phase Y configuration, and wherein at least the three insulated conductors are further configurable to provide heat to at least a portion of the formation during use; and

wherein the system is configurable to allow heat to transfer from at least the three insulated conductors to a selected section of the formation during use.

3530. The system of claim 3529, wherein at least the three insulated conductors are further configurable to generate heat during application of an electrical current to at least the three insulated conductors during use.

3531. The system of claim 3529, further comprising a support member, wherein the support member is configurable to support at least the three insulated conductors.

3532. The system of claim 3529, further comprising a support member and a centralizer, wherein the support member is configurable to support at least the three insulated conductors, and wherein the centralizer is configurable to maintain a location of at least the three insulated conductors on the support member.

3533. The system of claim 3529, wherein the opening comprises a diameter of at least approximately 5 cm.

3534. The system of claim 3529, further comprising at least one lead-in conductor coupled to at least the three insulated conductors, wherein at least the one lead-in conductor comprises a low resistance conductor configurable to generate substantially no heat.

3535. The system of claim 3529, further comprising at least one lead-in conductor coupled to at least the three insulated conductors, wherein at least the one lead-in conductor comprises a rubber insulated conductor.

3536. The system of claim 3529, further comprising at least one lead-in conductor coupled to at least the three insulated conductors. wherein at least the one lead-in conductor comprises a copper wire.

3537. The system of claim 3529, further comprising at least one lead-in conductor coupled to at least the three insulated conductors with a cold pin transition conductor.

3538. The system of claim 3529. further comprising at least one lead-in conductor coupled to at least the three insulated conductors with a cold pin transition conductor, wherein the cold pin transition conductor comprises a substantially low resistance insulated conductor.

3539. The system of claim 3529, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, and wherein the electrically insulating material is disposed in a sheath.

3540. The system of claim 3529, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, and wherein the conductor comprises a copper-nickel alloy.

3541. The system of claim 3529, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, wherein the conductor comprises a copper-nickel alloy, and wherein the copper-nickel alloy comprises approximately 7 % nickel by weight to approximately 12 % nickel by weight.

3542. The system of claim 3529, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, wherein the conductor comprises a copper-nickel alloy, and wherein the copper-nickel alloy comprises approximately 2 % nickel by weight to approximately 6 % nickel by weight.

3543. The system of claim 3529, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, and wherein the electrically insulating material comprises a thermally conductive material.

3544. The system of claim 3529, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, and wherein the electrically insulating material comprises magnesium oxide.

3545. The system of claim 3529, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, and wherein the magnesium oxide comprises a thickness of at least approximately 1 mm.

3546. The system of claim 3529, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, and wherein the electrically insulating material comprises aluminum oxide and magnesium oxide.

3547. The system of claim 3529, wherein the insulated conductor comprises a conductor disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, wherein the magnesium oxide comprises grain particles, and wherein the grain particles are configurable to occupy porous spaces within the magnesium oxide.

3548. The system of claim 3529, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, and wherein the electrically insulating material is disposed in a sheath, and wherein the sheath comprises a corrosion-resistant material.

3549. The system of claim 3529, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, and wherein the electrically insulating material is disposed in a sheath, and wherein the sheath comprises stainless steel.

3550. The system of claim 3529, wherein at least the three insulated conductors are configurable to generate radiant heat of approximately 500 W/m to approximately 1150 W/m during use.

3551. The system of claim 3529, further comprising a support member configurable to support at least the three insulated conductors, wherein the support member comprises

orifices configurable to provide fluid flow through the support member into the opening during use.

3552. The system of claim 3529, further comprising a support member configurable to support at least the three insulated conductors, wherein the support member comprises critical flow orifices configurable to provide a substantially constant amount of fluid flow through the support member into the opening during use.

3553. The system of claim 3529, further comprising a tube coupled to at least the three insulated conductors, wherein the tube is configurable to provide a flow of fluid into the opening during use.

3554. The system of claim 3529, further comprising a tube coupled to at least the three insulated conductors, wherein the tube comprises critical flow orifices configurable to provide a substantially constant amount of fluid flow through the support member into the opening during use.

3555. The system of claim 3529, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3556. The system of claim 3529, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3557. The system of claim 3529, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3558. The system of claim 3529, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the

formation. and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3559. The system of claim 3529, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is configurable to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3560. The system of claim 3529, further comprising an overburden casing coupled to the opening. wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

3561. The system of claim 3529, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, the system further comprising a wellhead coupled to the overburden casing and a lead-in conductor coupled to the insulated conductor, wherein the wellhead is disposed external to the overburden, wherein the wellhead comprises at least one sealing flange, and wherein at least the one sealing flange is configurable to couple to the lead-in conductor.

3562. The system of claim 3529, wherein the system is further configured to transfer heat such that the transferred heat can pyrolyze at least some hydrocarbons in the selected section.

3563. An in situ method for heating a coal formation, comprising:

applying an electrical current to at least three insulated conductors to provide heat to at least a portion of the formation, wherein at least the three insulated conductors are disposed within an opening in the formation; and

allowing the heat to transfer from at least the three insulated conductors to a selected section of the formation.

3564. The method of claim 3563, further comprising supporting at least the three insulated conductors on a support member.

3565. The method of claim 3563, further comprising supporting at least the three insulated conductors on a support member and maintaining a location of at least the three insulated conductors on the support member with a centralizer.

3566. The method of claim 3563, wherein the provided heat comprises approximately 500 W/m to approximately 1150 W/m.

3567. The method of claim 3563, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material. and wherein the conductor comprises a copper-nickel alloy.

3568. The method of claim 3563, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, wherein the conductor comprises a copper-nickel alloy, and wherein the copper-nickel alloy comprises approximately 7 % nickel by weight to approximately 12 % nickel by weight.

3569. The method of claim 3563, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material. wherein the conductor comprises a copper-nickel alloy, and wherein the copper-nickel alloy comprises approximately 2 % nickel by weight to approximately 6 % nickel by weight.

3570. The method of claim 3563, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material. and wherein the electrically insulating material comprises magnesium oxide.

3571. The method of claim 3563, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, and wherein the magnesium oxide comprises a thickness of at least approximately 1 mm.

3572. The method of claim 3563, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, and wherein the electrically insulating material comprises aluminum oxide and magnesium oxide.

3573. The method of claim 3563, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, wherein the electrically insulating material comprises magnesium oxide, wherein the magnesium oxide comprises grain particles, and wherein the grain particles are configured to occupy porous spaces within the magnesium oxide.

3574. The method of claim 3563, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, wherein the insulating material is disposed in a sheath, and wherein the sheath comprises a corrosion-resistant material.

3575. The method of claim 3563, wherein at least the three insulated conductors comprise a conductor disposed in an electrically insulating material, wherein the insulating material is disposed in a sheath, and wherein the sheath comprises stainless steel.

3576. The method of claim 3563, further comprising supporting at least the three insulated conductors on a support member and flowing a fluid into the opening through an orifice in the support member.

3577. The method of claim 3563, further comprising supporting at least the three insulated conductors on a support member and flowing a substantially constant amount of fluid into the opening through critical flow orifices in the support member.

3578. The method of claim 3563, wherein a perforated tube is disposed in the opening proximate to at least the three insulated conductors, the method further comprising flowing a fluid into the opening through the perforated tube.

3579. The method of claim 3563, wherein a tube is disposed in the opening proximate to at least the three insulated conductors, the method further comprising flowing a substantially constant amount a fluid into the opening through critical flow orifices in the tube.

3580. The method of claim 3563, further comprising supporting at least the three insulated conductors on a support member and flowing a corrosion inhibiting fluid into the opening through an orifice in the support member.

3581. The method of claim 3563, wherein a perforated tube is disposed in the opening proximate to at least the three insulated conductors, the method further comprising flowing a corrosion inhibiting fluid into the opening through the perforated tube.

3582. The method of claim 3563, further comprising determining a temperature distribution in at least the three insulated conductors using an electromagnetic signal provided to the insulated conductor.

3583. The method of claim 3563, further comprising monitoring a leakage current of at least the three insulated conductors.

3584. The method of claim 3563, further comprising monitoring the applied electrical current.

3585. The method of claim 3563, further comprising monitoring a voltage applied to at least the three insulated conductors.

3586. The method of claim 3563, further comprising monitoring a temperature in at least the three insulated conductors with at least one thermocouple.

3587. The method of claim 3563, further comprising electrically coupling a lead-in conductor to at least the three insulated conductors, wherein the lead-in conductor comprises a low resistance conductor configured to generate substantially no heat.

3588. The method of claim 3563, further comprising electrically coupling a lead-in conductor to at least the three insulated conductors using a cold pin transition conductor.

3589. The method of claim 3563, further comprising electrically coupling a lead-in conductor to at least the three insulated conductors using a cold pin transition conductor, wherein the cold pin transition conductor comprises a substantially low resistance insulated conductor.

3590. The method of claim 3563, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3591. The method of claim 3563, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3592. The method of claim 3563, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3593. The method of claim 3563, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3594. The method of claim 3563, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the method further comprises inhibiting a flow of fluid between the opening and the overburden casing with a packing material.

3595. The method of claim 3563, further comprising heating at least the portion of the formation to substantially pyrolyze at least some of the hydrocarbons within the formation.

3596. A system configured to heat a coal formation, comprising:

a first conductor disposed in a first conduit, wherein the first conduit is disposed within an opening in the formation, and wherein the first conductor is configured to provide heat to at least a portion of the formation during use; and

wherein the system is configured to allow heat to transfer from the first conductor to a section of the formation during use.

3597. The system of claim 3596, wherein the first conductor is further configured to generate heat during application of an electrical current to the first conductor.

3598. The system of claim 3596, wherein the first conductor comprises a pipe.

3599. The system of claim 3596, wherein the first conductor comprises stainless steel.

3600. The system of claim 3596, wherein the first conduit comprises stainless steel.

3601. The system of claim 3596, further comprising a centralizer configured to maintain a location of the first conductor within the first conduit.

3602. The system of claim 3596, further comprising a centralizer configured to maintain a location of the first conductor within the first conduit, wherein the centralizer comprises ceramic material.

3603. The system of claim 3596, further comprising a centralizer configured to maintain a location of the first conductor within the first conduit. wherein the centralizer comprises ceramic material and stainless steel.

3604. The system of claim 3596, wherein the opening comprises a diameter of at least approximately 5 cm.

3605. The system of claim 3596, further comprising a lead-in conductor coupled to the first conductor, wherein the lead-in conductor comprises a low resistance conductor configured to generate substantially no heat.

3606. The system of claim 3596, further comprising a lead-in conductor coupled to the first conductor, wherein the lead-in conductor comprises copper.

3607. The system of claim 3596. further comprising a sliding electrical connector coupled to the first conductor.

3608. The system of claim 3596, further comprising a sliding electrical connector coupled to the first conductor. wherein the sliding electrical connector is further coupled to the first conduit.

3609. The system of claim 3596, further comprising a sliding electrical connector coupled to the first conductor, wherein the sliding electrical connector is further coupled

to the first conduit, and wherein the sliding electrical connector is configured to complete an electrical circuit with the first conductor and the first conduit.

3610. The system of claim 3596, further comprising a second conductor disposed within the first conduit and at least one sliding electrical connector coupled to the first conductor and the second conductor, wherein at least the one sliding electrical connector is configured to generate less heat than the first conductor or the second conductor during use.

3611. The system of claim 3596, wherein the first conduit comprises a first section and a second section, wherein a thickness of the first section is greater than a thickness of the second section such that heat radiated from the first conductor to the section along the first section of the conduit is less than heat radiated from the first conductor to the section along the second section of the conduit.

3612. The system of claim 3596, further comprising a fluid disposed within the first conduit, wherein the fluid is configured to maintain a pressure within the first conduit to substantially inhibit deformation of the first conduit during use.

3613. The system of claim 3596, further comprising a thermally conductive fluid disposed within the first conduit.

3614. The system of claim 3596, further comprising a thermally conductive fluid disposed within the first conduit, wherein the thermally conductive fluid comprises helium.

3615. The system of claim 3596, further comprising a fluid disposed within the first conduit, wherein the fluid is configured to substantially inhibit arcing between the first conductor and the first conduit during use.

3616. The system of claim 3596, further comprising a tube disposed within the opening external to the first conduit, wherein the tube is configured to remove vapor produced from at least the heated portion of the formation such that a pressure balance is maintained between the first conduit and the opening to substantially inhibit deformation of the first conduit during use.

3617. The system of claim 3596, wherein the first conductor is further configured to generate radiant heat of approximately 650 W/m to approximately 1650 W/m during use.

3618. The system of claim 3596, further comprising a second conductor disposed within a second conduit and a third conductor disposed within a third conduit, wherein first conduit, the second conduit and the third conduit are disposed in different openings of the formation, wherein the first conductor is electrically coupled to the second conductor and the third conductor, and wherein the first, second, and third conductors are configured to operate in a 3-phase Y configuration during use.

3619. The system of claim 3596, further comprising a second conductor disposed within the first conduit, wherein the second conductor is electrically coupled to the first conductor to form an electrical circuit.

3620. The system of claim 3596, further comprising a second conductor disposed within the first conduit, wherein the second conductor is electrically coupled to the first conductor to form an electrical circuit with a connector.

3621. The system of claim 3596, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3622. The system of claim 3596, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3623. The system of claim 3596, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3624. The system of claim 3596, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3625. The system of claim 3596, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is further configured to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3626. The system of claim 3596, further comprising an overburden casing coupled to the opening and a substantially low resistance conductor disposed within the overburden casing, wherein the substantially low resistance conductor is electrically coupled to the first conductor.

3627. The system of claim 3596, further comprising an overburden casing coupled to the opening and a substantially low resistance conductor disposed within the overburden casing, wherein the substantially low resistance conductor is electrically coupled to the first conductor, and wherein the substantially low resistance conductor comprises carbon steel.

3628. The system of claim 3596, further comprising an overburden casing coupled to the opening and a substantially low resistance conductor disposed within the overburden casing and a centralizer configured to support the substantially low resistance conductor within the overburden casing.

3629. The system of claim 3596, wherein the heated section of the formation is substantially pyrolyzed.

3630. A system configurable to heat a coal formation, comprising:

a first conductor configurable to be disposed in a first conduit, wherein the first conduit is configurable to be disposed within an opening in the formation, and wherein the first conductor is further configurable to provide heat to at least a portion of the formation during use; and

wherein the system is configurable to allow heat to transfer from the first conductor to a section of the formation during use.

3631. The system of claim 3630, wherein the first conductor is further configurable to generate heat during application of an electrical current to the first conductor.

3632. The system of claim 3630, wherein the first conductor comprises a pipe.

3633. The system of claim 3630, wherein the first conductor comprises stainless steel.

3634. The system of claim 3630, wherein the first conduit comprises stainless steel.

3635. The system of claim 3630, further comprising a centralizer configurable to maintain a location of the first conductor within the first conduit.

3636. The system of claim 3630, further comprising a centralizer configurable to maintain a location of the first conductor within the first conduit, wherein the centralizer comprises ceramic material.

3637. The system of claim 3630, further comprising a centralizer configurable to maintain a location of the first conductor within the first conduit, wherein the centralizer comprises ceramic material and stainless steel.

3638. The system of claim 3630, wherein the opening comprises a diameter of at least approximately 5 cm.

3639. The system of claim 3630, further comprising a lead-in conductor coupled to the first conductor, wherein the lead-in conductor comprises a low resistance conductor configurable to generate substantially no heat.

3640. The system of claim 3630, further comprising a lead-in conductor coupled to the first conductor, wherein the lead-in conductor comprises copper.

3641. The system of claim 3630, further comprising a sliding electrical connector coupled to the first conductor.

3642. The system of claim 3630, further comprising a sliding electrical connector coupled to the first conductor, wherein the sliding electrical connector is further coupled to the first conduit.

3643. The system of claim 3630, further comprising a sliding electrical connector coupled to the first conductor, wherein the sliding electrical connector is further coupled to the first conduit, and wherein the sliding electrical connector is configurable to complete an electrical circuit with the first conductor and the first conduit.

3644. The system of claim 3630. further comprising a second conductor disposed within the first conduit and at least one sliding electrical connector coupled to the first conductor and the second conductor, wherein at least the one sliding electrical connector is configurable to generate less heat than the first conductor or the second conductor during use.

3645. The system of claim 3630, wherein the first conduit comprises a first section and a second section, wherein a thickness of the first section is greater than a thickness of the

second section such that heat radiated from the first conductor to the section along the first section of the conduit is less than heat radiated from the first conductor to the section along the second section of the conduit.

3646. The system of claim 3630, further comprising a fluid disposed within the first conduit, wherein the fluid is configurable to maintain a pressure within the first conduit to substantially inhibit deformation of the first conduit during use.

3647. The system of claim 3630, further comprising a thermally conductive fluid disposed within the first conduit.

3648. The system of claim 3630, further comprising a thermally conductive fluid disposed within the first conduit, wherein the thermally conductive fluid comprises helium.

3649. The system of claim 3630, further comprising a fluid disposed within the first conduit, wherein the fluid is configurable to substantially inhibit arcing between the first conductor and the first conduit during use.

3650. The system of claim 3630, further comprising a tube disposed within the opening external to the first conduit, wherein the tube is configurable to remove vapor produced from at least the heated portion of the formation such that a pressure balance is maintained between the first conduit and the opening to substantially inhibit deformation of the first conduit during use.

3651. The system of claim 3630, wherein the first conductor is further configurable to generate radiant heat of approximately 650 W/m to approximately 1650 W/m during use.

3652. The system of claim 3630, further comprising a second conductor disposed within a second conduit and a third conductor disposed within a third conduit, wherein first conduit, the second conduit and the third conduit are disposed in different openings of the

formation. wherein the first conductor is electrically coupled to the second conductor and the third conductor, and wherein the first, second, and third conductors are configurable to operate in a 3-phase Y configuration during use.

3653. The system of claim 3630, further comprising a second conductor disposed within the first conduit, wherein the second conductor is electrically coupled to the first conductor to form an electrical circuit.

3654. The system of claim 3630, further comprising a second conductor disposed within the first conduit, wherein the second conductor is electrically coupled to the first conductor to form an electrical circuit with a connector.

3655. The system of claim 3630, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3656. The system of claim 3630, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3657. The system of claim 3630, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3658. The system of claim 3630, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3659. The system of claim 3630, further comprising an overburden casing coupled to the opening. wherein the overburden casing is disposed in an overburden of the

formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is further configurable to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3660. The system of claim 3630, further comprising an overburden casing coupled to the opening and a substantially low resistance conductor disposed within the overburden casing, wherein the substantially low resistance conductor is electrically coupled to the first conductor.

3661. The system of claim 3630, further comprising an overburden casing coupled to the opening and a substantially low resistance conductor disposed within the overburden casing, wherein the substantially low resistance conductor is electrically coupled to the first conductor, and wherein the substantially low resistance conductor comprises carbon steel.

3662. The system of claim 3630, further comprising an overburden casing coupled to the opening and a substantially low resistance conductor disposed within the overburden casing and a centralizer configurable to support the substantially low resistance conductor within the overburden casing.

3663. The system of claim 3630, wherein the heated section of the formation is substantially pyrolyzed.

3664. An in situ method for heating a coal formation, comprising:

applying an electrical current to a first conductor to provide heat to at least a portion of the formation, wherein the first conductor is disposed in a first conduit, and wherein the first conduit is disposed within an opening in the formation; and

allowing the heat to transfer from the first conductor to a section of the formation.

3665. The method of claim 3664, wherein the first conductor comprises a pipe.

3666. The method of claim 3664, wherein the first conductor comprises stainless steel.

3667. The method of claim 3664, wherein the first conduit comprises stainless steel.

3668. The method of claim 3664, further comprising maintaining a location of the first conductor in the first conduit with a centralizer.

3669. The method of claim 3664, further comprising maintaining a location of the first conductor in the first conduit with a centralizer, wherein the centralizer comprises ceramic material.

3670. The method of claim 3664, further comprising maintaining a location of the first conductor in the first conduit with a centralizer, wherein the centralizer comprises ceramic material and stainless steel.

3671. The method of claim 3664, further comprising coupling a sliding electrical connector to the first conductor.

3672. The method of claim 3664, further comprising electrically coupling a sliding electrical connector to the first conductor and the first conduit, wherein the first conduit comprises an electrical lead configured to complete an electrical circuit with the first conductor.

3673. The method of claim 3664, further comprising coupling a sliding electrical connector to the first conductor and the first conduit, wherein the first conduit comprises an electrical lead configured to complete an electrical circuit with the first conductor, and wherein the generated heat comprises approximately 20 percent generated by the first conduit.

3674. The method of claim 3664, wherein the provided heat comprises approximately 650 W/m to approximately 1650 W/m.

3675. The method of claim 3664, further comprising determining a temperature distribution in the first conduit using an electromagnetic signal provided to the conduit.

3676. The method of claim 3664, further comprising monitoring the applied electrical current.

3677. The method of claim 3664, further comprising monitoring a voltage applied to the first conductor.

3678. The method of claim 3664, further comprising monitoring a temperature in the conduit with at least one thermocouple.

3679. The method of claim 3664, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3680. The method of claim 3664, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3681. The method of claim 3664, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3682. The method of claim 3664, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3683. The method of claim 3664, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation. and wherein the method further comprises inhibiting a flow of fluid between the opening and the overburden casing with a packing material.

3684. The method of claim 3664, further comprising coupling an overburden casing to the opening, wherein a substantially low resistance conductor is disposed within the overburden casing, and wherein the substantially low resistance conductor is electrically coupled to the first conductor.

3685. The method of claim 3664, further comprising coupling an overburden casing to the opening, wherein a substantially low resistance conductor is disposed within the overburden casing, wherein the substantially low resistance conductor is electrically coupled to the first conductor, and wherein the substantially low resistance conductor comprises carbon steel.

3686. The method of claim 3664, further comprising coupling an overburden casing to the opening, wherein a substantially low resistance conductor is disposed within the overburden casing, wherein the substantially low resistance conductor is electrically coupled to the first conductor, and wherein the method further comprises maintaining a location of the substantially low resistance conductor in the overburden casing with a centralizer support.

3687. The method of claim 3664, further comprising electrically coupling a lead-in conductor to the first conductor, wherein the lead-in conductor comprises a low resistance conductor configured to generate substantially no heat.

3688. The method of claim 3664, further comprising electrically coupling a lead-in conductor to the first conductor, wherein the lead-in conductor comprises copper.

3689. The method of claim 3664, further comprising maintaining a sufficient pressure between the first conduit and the formation to substantially inhibit deformation of the first conduit.

3690. The method of claim 3664, further comprising providing a thermally conductive fluid within the first conduit.

3691. The method of claim 3664, further comprising providing a thermally conductive fluid within the first conduit, wherein the thermally conductive fluid comprises helium.

3692. The method of claim 3664, further comprising inhibiting arcing between the first conductor and the first conduit with a fluid disposed within the first conduit.

3693. The method of claim 3664, further comprising removing a vapor from the opening using a perforated tube disposed proximate to the first conduit in the opening to control a pressure in the opening.

3694. The method of claim 3664, further comprising flowing a corrosion inhibiting fluid through a perforated tube disposed proximate to the first conduit in the opening.

3695. The method of claim 3664, wherein a second conductor is disposed within the first conduit, wherein the second conductor is electrically coupled to the first conductor to form an electrical circuit.

3696. The method of claim 3664, wherein a second conductor is disposed within the first conduit, wherein the second conductor is electrically coupled to the first conductor with a connector.

3697. The method of claim 3664, wherein a second conductor is disposed within a second conduit and a third conductor is disposed within a third conduit, wherein the second conduit and the third conduit are disposed in different openings of the formation,

wherein the first conductor is electrically coupled to the second conductor and the third conductor. and wherein the first, second, and third conductors are configured to operate in a 3-phase Y configuration.

3698. The method of claim 3664, wherein a second conductor is disposed within the first conduit, wherein at least one sliding electrical connector is coupled to the first conductor and the second conductor, and wherein heat generated by at least the one sliding electrical connector is less than heat generated by the first conductor or the second conductor.

3699. The method of claim 3664, wherein the first conduit comprises a first section and a second section, wherein a thickness of the first section is greater than a thickness of the second section such that heat radiated from the first conductor to the section along the first section of the conduit is less than heat radiated from the first conductor to the section along the second section of the conduit.

3700. The method of claim 3664. further comprising flowing an oxidizing fluid through an orifice in the first conduit.

3701. The method of claim 3664, further comprising disposing a perforated tube proximate to the first conduit and flowing an oxidizing fluid through the perforated tube.

3702. The method of claim 3664, further comprising heating at least the portion of the formation to substantially pyrolyze at least some of the carbon within the formation.

3703. A system configured to heat a coal formation, comprising:

a first conductor disposed in a first conduit, wherein the first conduit is disposed within a first opening in the formation;

a second conductor disposed in a second conduit, wherein the second conduit is disposed within a second opening in the formation;

a third conductor disposed in a third conduit, wherein the third conduit is disposed within a third opening in the formation, wherein the first, second, and third conductors are electrically coupled in a 3-phase Y configuration, and wherein the first, second, and third conductors are configured to provide heat to at least a portion of the formation during use; and

wherein the system is configured to allow heat to transfer from the first, second, and third conductors to a selected section of the formation during use.

3704. The system of claim 3703, wherein the first, second, and third conductors are further configured to generate heat during application of an electrical current to the first conductor.

3705. The system of claim 3703, wherein the first, second, and third conductors comprise a pipe.

3706. The system of claim 3703, wherein the first, second, and third conductors comprise stainless steel.

3707. The system of claim 3703, wherein the first, second, and third openings comprise a diameter of at least approximately 5 cm.

3708. The system of claim 3703, further comprising a first sliding electrical connector coupled to the first conductor and a second sliding electrical connector coupled to the second conductor and a third sliding electrical connector coupled to the third conductor.

3709. The system of claim 3703, further comprising a first sliding electrical connector coupled to the first conductor, wherein the first sliding electrical connector is further coupled to the first conduit.

3710. The system of claim 3703, further comprising a second sliding electrical connector coupled to the second conductor, wherein the second sliding electrical connector is further coupled to the second conduit.

3711. The system of claim 3703, further comprising a third sliding electrical connector coupled to the third conductor, wherein the third sliding electrical connector is further coupled to the third conduit.

3712. The system of claim 3703, wherein each of the first, second, and third conduits comprises a first section and a second section, wherein a thickness of the first section is greater than a thickness of the second section such that heat radiated from each of the first, second, and third conductors to the section along the first section of each of the conduits is less than heat radiated from the first, second, and third conductors to the section along the second section of each of the conduits.

3713. The system of claim 3703, further comprising a fluid disposed within the first, second, and third conduits, wherein the fluid is configured to maintain a pressure within the first conduit to substantially inhibit deformation of the first, second, and third conduits during use.

3714. The system of claim 3703, further comprising a thermally conductive fluid disposed within the first, second, and third conduits.

3715. The system of claim 3703, further comprising a thermally conductive fluid disposed within the first, second, and third conduits, wherein the thermally conductive fluid comprises helium.

3716. The system of claim 3703, further comprising a fluid disposed within the first, second, and third conduits, wherein the fluid is configured to substantially inhibit arcing between the first, second, and third conductors and the first, second, and third conduits during use.

3717. The system of claim 3703, further comprising at least one tube disposed within the first, second, and third openings external to the first, second, and third conduits, wherein at least the one tube is configured to remove vapor produced from at least the heated portion of the formation such that a pressure balance is maintained between the first, second, and third conduits and the first, second, and third openings to substantially inhibit deformation of the first, second, and third conduits during use.

3718. The system of claim 3703, wherein the first, second, and third conductors are further configured to generate radiant heat of approximately 650 W/m to approximately 1650 W/m during use.

3719. The system of claim 3703, further comprising at least one overburden casing coupled to the first, second, and third openings, wherein at least the one overburden casing is disposed in an overburden of the formation.

3720. The system of claim 3703, further comprising at least one overburden casing coupled to the first, second, and third openings, wherein at least the one overburden casing is disposed in an overburden of the formation, and wherein at least the one overburden casing comprises steel.

3721. The system of claim 3703, further comprising at least one overburden casing coupled to the first, second, and third openings, wherein at least the one overburden casing is disposed in an overburden of the formation, and wherein at least the one overburden casing is further disposed in cement.

3722. The system of claim 3703, further comprising at least one overburden casing coupled to the first, second, and third openings, wherein at least the one overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of at least the one overburden casing and the first, second, and third openings.

3723. The system of claim 3703, further comprising at least one overburden casing coupled to the first, second, and third openings, wherein at least the one overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of at least the one overburden casing and the first, second, and third openings, and wherein the packing material is further configured to substantially inhibit a flow of fluid between the first, second, and third opening and at least the one overburden casing during use.

3724. The system of claim 3703, wherein the heated section of the formation is substantially pyrolyzed.

3725. A system configurable to heat a coal formation, comprising:

a first conductor configurable to be disposed in a first conduit, wherein the first conduit is configurable to be disposed within a first opening in the formation;

a second conductor configurable to be disposed in a second conduit, wherein the second conduit is configurable to be disposed within a second opening in the formation;

a third conductor configurable to be disposed in a third conduit, wherein the third conduit is configurable to be disposed within a third opening in the formation, wherein the first, second, and third conductors are further configurable to be electrically coupled in a 3-phase Y configuration, and wherein the first, second, and third conductors are further configurable to provide heat to at least a portion of the formation during use: and

wherein the system is configurable to allow heat to transfer from the first, second, and third conductors to a selected section of the formation during use.

3726. The system of claim 3725, wherein the first, second, and third conductors are further configurable to generate heat during application of an electrical current to the first conductor.

3727. The system of claim 3725, wherein the first, second, and third conductors comprise a pipe.

3728. The system of claim 3725, wherein the first, second, and third conductors comprise stainless steel.

3729. The system of claim 3725, wherein the first, second, and third opening comprise a diameter of at least approximately 5 cm.

3730. The system of claim 3725, further comprising a first sliding electrical connector coupled to the first conductor and a second sliding electrical connector coupled to the second conductor and a third sliding electrical connector coupled to the third conductor.

3731. The system of claim 3725, further comprising a first sliding electrical connector coupled to the first conductor, wherein the first sliding electrical connector is further coupled to the first conduit.

3732. The system of claim 3725, further comprising a second sliding electrical connector coupled to the second conductor, wherein the second sliding electrical connector is further coupled to the second conduit.

3733. The system of claim 3725, further comprising a third sliding electrical connector coupled to the third conductor, wherein the third sliding electrical connector is further coupled to the third conduit.

3734. The system of claim 3725, wherein each of the first, second, and third conduits comprises a first section and a second section, wherein a thickness of the first section is greater than a thickness of the second section such that heat radiated from each of the first, second, and third conductors to the section along the first section of each of the conduits is less than heat radiated from the first, second, and third conductors to the section along the second section of each of the conduits.

3735. The system of claim 3725, further comprising a fluid disposed within the first, second, and third conduits, wherein the fluid is configurable to maintain a pressure within the first conduit to substantially inhibit deformation of the first, second, and third conduits during use.

3736. The system of claim 3725, further comprising a thermally conductive fluid disposed within the first, second, and third conduits.

3737. The system of claim 3725, further comprising a thermally conductive fluid disposed within the first, second, and third conduits, wherein the thermally conductive fluid comprises helium.

3738. The system of claim 3725. further comprising a fluid disposed within the first, second, and third conduits, wherein the fluid is configurable to substantially inhibit arcing between the first. second, and third conductors and the first, second, and third conduits during use.

3739. The system of claim 3725, further comprising at least one tube disposed within the first, second, and third openings external to the first, second, and third conduits, wherein at least the one tube is configurable to remove vapor produced from at least the heated portion of the formation such that a pressure balance is maintained between the first, second, and third conduits and the first, second, and third openings to substantially inhibit deformation of the first, second, and third conduits during use.

3740. The system of claim 3725, wherein the first, second, and third conductors are further configurable to generate radiant heat of approximately 650 W/m to approximately 1650 W/m during use.

3741. The system of claim 3725. further comprising at least one overburden casing coupled to the first. second. and third openings, wherein at least the one overburden casing is disposed in an overburden of the formation.

3742. The system of claim 3725, further comprising at least one overburden casing coupled to the first, second, and third openings, wherein at least the one overburden casing is disposed in an overburden of the formation, and wherein at least the one overburden casing comprises steel.

3743. The system of claim 3725, further comprising at least one overburden casing coupled to the first, second, and third openings, wherein at least the one overburden casing is disposed in an overburden of the formation, and wherein at least the one overburden casing is further disposed in cement.

3744. The system of claim 3725, further comprising at least one overburden casing coupled to the first, second, and third openings, wherein at least the one overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of at least the one overburden casing and the first, second, and third openings.

3745. The system of claim 3725, further comprising at least one overburden casing coupled to the first, second, and third openings, wherein at least the one overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of at least the one overburden casing and the first, second, and third openings, and wherein the packing material is further configurable to substantially inhibit a flow of fluid between the first, second, and third opening and at least the one overburden casing during use.

3746. The system of claim 3725, wherein the heated section of the formation is substantially pyrolyzed.

3747. An in situ method for heating a coal formation, comprising:

applying an electrical current to a first conductor to provide heat to at least a portion of the formation, wherein the first conductor is disposed in a first conduit. and wherein the first conduit is disposed within a first opening in the formation;

applying an electrical current to a second conductor to provide heat to at least a portion of the formation, wherein the second conductor is disposed in a second conduit, and wherein the second conduit is disposed within a second opening in the formation;

applying an electrical current to a third conductor to provide heat to at least a portion of the formation, wherein the third conductor is disposed in a third conduit. and wherein the third conduit is disposed within a third opening in the formation; and

allowing the heat to transfer from the first, second, and third conductors to a selected section of the formation.

3748. The method of claim 3747, wherein the first, second, and third conductors comprise a pipe.

3749. The method of claim 3747, wherein the first, second, and third conductors comprise stainless steel.

3750. The method of claim 3747, wherein the first, second, and third conduits comprise stainless steel.

3751. The method of claim 3747, wherein the provided heat comprises approximately 650 W/m to approximately 1650 W/m.

3752. The method of claim 3747, further comprising determining a temperature distribution in the first, second, and third conduits using an electromagnetic signal provided to the first, second, and third conduits.

3753. The method of claim 3747, further comprising monitoring the applied electrical current.

3754. The method of claim 3747, further comprising monitoring a voltage applied to the first, second, and third conductors.

3755. The method of claim 3747, further comprising monitoring a temperature in the first, second. and third conduits with at least one thermocouple.

3756. The method of claim 3747, further comprising maintaining a sufficient pressure between the first, second, and third conduits and the first, second, and third openings to substantially inhibit deformation of the first, second, and third conduits.

3757. The method of claim 3747, further comprising providing a thermally conductive fluid within the first, second, and third conduits.

3758. The method of claim 3747, further comprising providing a thermally conductive fluid within the first, second, and third conduits, wherein the thermally conductive fluid comprises helium.

3759. The method of claim 3747, further comprising inhibiting arcing between the first, second, and third conductors and the first, second, and third conduits with a fluid disposed within the first, second, and third conduits.

3760. The method of claim 3747, further comprising removing a vapor from the first, second, and third openings using at least one perforated tube disposed proximate to the first, second, and third conduits in the first, second, and third openings to control a pressure in the first, second, and third openings.

3761. The method of claim 3747, wherein the first, second, and third conduits comprise a first section and a second section, wherein a thickness of the first section is greater than a thickness of the second section such that heat radiated from the first, second, and third conductors to the section along the first section of the first, second, and third conduits is

less than heat radiated from the first, second, and third conductors to the section along the second section of the first, second, and third conduits.

3762. The method of claim 3747, further comprising flowing an oxidizing fluid through an orifice in the first, second, and third conduits.

3763. The method of claim 3747, further comprising heating at least the portion of the formation to substantially pyrolyze at least some of the carbon within the formation.

3764. A system configured to heat a coal formation, comprising:

a first conductor disposed in a conduit, wherein the conduit is disposed within an opening in the formation; and

a second conductor disposed in the conduit, wherein the second conductor is electrically coupled to the first conductor with a connector, and wherein the first and second conductors are configured to provide heat to at least a portion of the formation during use; and

wherein the system is configured to allow heat to transfer from the first and second conductors to a selected section of the formation during use.

3765. The system of claim 3764, wherein the first conductor is further configured to generate heat during application of an electrical current to the first conductor.

3766. The system of claim 3764, wherein the first and second conductors comprise a pipe.

3767. The system of claim 3764, wherein the first and second conductors comprise stainless steel.

3768. The system of claim 3764, wherein the conduit comprises stainless steel.

3769. The system of claim 3764, further comprising a centralizer configured to maintain a location of the first and second conductors within the conduit.

3770. The system of claim 3764, further comprising a centralizer configured to maintain a location of the first and second conductors within the conduit, wherein the centralizer comprises ceramic material.

3771. The system of claim 3764, further comprising a centralizer configured to maintain a location of the first and second conductors within the conduit, wherein the centralizer comprises ceramic material and stainless steel.

3772. The system of claim 3764, wherein the opening comprises a diameter of at least approximately 5 cm.

3773. The system of claim 3764, further comprising a lead-in conductor coupled to the first and second conductors, wherein the lead-in conductor comprises a low resistance conductor configured to generate substantially no heat.

3774. The system of claim 3764, further comprising a lead-in conductor coupled to the first and second conductors, wherein the lead-in conductor comprises copper.

3775. The system of claim 3764, wherein the conduit comprises a first section and a second section, wherein a thickness of the first section is greater than a thickness of the second section such that heat radiated from the first conductor to the section along the first section of the conduit is less than heat radiated from the first conductor to the section along the second section of the conduit.

3776. The system of claim 3764, further comprising a fluid disposed within the conduit, wherein the fluid is configured to maintain a pressure within the conduit to substantially inhibit deformation of the conduit during use.

3777. The system of claim 3764, further comprising a thermally conductive fluid disposed within the conduit.

3778. The system of claim 3764, further comprising a thermally conductive fluid disposed within the conduit, wherein the thermally conductive fluid comprises helium.

3779. The system of claim 3764, further comprising a fluid disposed within the conduit, wherein the fluid is configured to substantially inhibit arcing between the first and second conductors and the conduit during use.

3780. The system of claim 3764, further comprising a tube disposed within the opening external to the conduit, wherein the tube is configured to remove vapor produced from at least the heated portion of the formation such that a pressure balance is maintained between the conduit and the opening to substantially inhibit deformation of the conduit during use.

3781. The system of claim 3764, wherein the first and second conductors are further configured to generate radiant heat of approximately 650 W/m to approximately 1650 W/m during use.

3782. The system of claim 3764, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3783. The system of claim 3764, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3784. The system of claim 3764, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3785. The system of claim 3764, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3786. The system of claim 3764, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is further configured to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3787. The system of claim 3764, wherein the heated section of the formation is substantially pyrolyzed.

3788. A system configurable to heat a coal formation, comprising:

a first conductor configurable to be disposed in a conduit, wherein the conduit is configurable to be disposed within an opening in the formation; and

a second conductor configurable to be disposed in the conduit, wherein the second conductor is configurable to be electrically coupled to the first conductor with a connector, and wherein the first and second conductors are further configurable to provide heat to at least a portion of the formation during use; and

wherein the system is configurable to allow heat to transfer from the first and second conductors to a selected section of the formation during use.

3789. The system of claim 3788, wherein the first conductor is further configurable to generate heat during application of an electrical current to the first conductor.

3790. The system of claim 3788, wherein the first and second conductors comprise a pipe.

3791. The system of claim 3788, wherein the first and second conductors comprise stainless steel.

3792. The system of claim 3788, wherein the conduit comprises stainless steel.

3793. The system of claim 3788, further comprising a centralizer configurable to maintain a location of the first and second conductors within the conduit.

3794. The system of claim 3788, further comprising a centralizer configurable to maintain a location of the first and second conductors within the conduit, wherein the centralizer comprises ceramic material.

3795. The system of claim 3788. further comprising a centralizer configurable to maintain a location of the first and second conductors within the conduit, wherein the centralizer comprises ceramic material and stainless steel.

3796. The system of claim 3788, wherein the opening comprises a diameter of at least approximately 5 cm.

3797. The system of claim 3788, further comprising a lead-in conductor coupled to the first and second conductors, wherein the lead-in conductor comprises a low resistance conductor configurable to generate substantially no heat.

3798. The system of claim 3788, further comprising a lead-in conductor coupled to the first and second conductors, wherein the lead-in conductor comprises copper.

3799. The system of claim 3788, wherein the conduit comprises a first section and a second section, wherein a thickness of the first section is greater than a thickness of the second section such that heat radiated from the first conductor to the section along the first section of the conduit is less than heat radiated from the first conductor to the section along the second section of the conduit.

3800. The system of claim 3788, further comprising a fluid disposed within the conduit, wherein the fluid is configurable to maintain a pressure within the conduit to substantially inhibit deformation of the conduit during use.

3801. The system of claim 3788, further comprising a thermally conductive fluid disposed within the conduit.

3802. The system of claim 3788, further comprising a thermally conductive fluid disposed within the conduit, wherein the thermally conductive fluid comprises helium.

3803. The system of claim 3788, further comprising a fluid disposed within the conduit, wherein the fluid is configurable to substantially inhibit arcing between the first and second conductors and the conduit during use.

3804. The system of claim 3788, further comprising a tube disposed within the opening external to the conduit, wherein the tube is configurable to remove vapor produced from at least the heated portion of the formation such that a pressure balance is maintained between the conduit and the opening to substantially inhibit deformation of the conduit during use.

3805. The system of claim 3788, wherein the first and second conductors are further configurable to generate radiant heat of approximately 650 W/m to approximately 1650 W/m during use.

3806. The system of claim 3788, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3807. The system of claim 3788, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation. and wherein the overburden casing comprises steel.

3808. The system of claim 3788, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3809. The system of claim 3788, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3810. The system of claim 3788, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is further configurable to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3811. The system of claim 3788, wherein the heated section of the formation is substantially pyrolyzed.

3812. An in situ method for heating a coal formation, comprising:

applying an electrical current to at least two conductors to provide heat to at least a portion of the formation, wherein at least the two conductors are disposed within a conduit, wherein the conduit is disposed within an opening in the formation, and wherein at least the two conductors are electrically coupled with a connector; and

allowing heat to transfer from at least the two conductors to a selected section of the formation.

3813. The method of claim 3812, wherein at least the two conductors comprise a pipe.

3814. The method of claim 3812, wherein at least the two conductors comprise stainless steel.

3815. The method of claim 3812, wherein the conduit comprises stainless steel.

3816. The method of claim 3812, further comprising maintaining a location of at least the two conductors in the conduit with a centralizer.

3817. The method of claim 3812, further comprising maintaining a location of at least the two conductors in the conduit with a centralizer, wherein the centralizer comprises ceramic material.

3818. The method of claim 3812, further comprising maintaining a location of at least the two conductors in the conduit with a centralizer, wherein the centralizer comprises ceramic material and stainless steel.

3819. The method of claim 3812, wherein the provided heat comprises approximately 650 W/m to approximately 1650 W/m.

3820. The method of claim 3812, further comprising determining a temperature distribution in the conduit using an electromagnetic signal provided to the conduit.

3821. The method of claim 3812, further comprising monitoring the applied electrical current.

3822. The method of claim 3812, further comprising monitoring a voltage applied to at least the two conductors.

3823. The method of claim 3812, further comprising monitoring a temperature in the conduit with at least one thermocouple.

3824. The method of claim 3812, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3825. The method of claim 3812, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3826. The method of claim 3812, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3827. The method of claim 3812, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3828. The method of claim 3812, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the method further comprises inhibiting a flow of fluid between the opening and the overburden casing with a packing material.

3829. The method of claim 3812, further comprising maintaining a sufficient pressure between the conduit and the formation to substantially inhibit deformation of the conduit.

3830. The method of claim 3812, further comprising providing a thermally conductive fluid within the conduit.

3831. The method of claim 3812, further comprising providing a thermally conductive fluid within the conduit, wherein the thermally conductive fluid comprises helium.

3832. The method of claim 3812, further comprising inhibiting arcing between at least the two conductors and the conduit with a fluid disposed within the conduit.

3833. The method of claim 3812, further comprising removing a vapor from the opening using a perforated tube disposed proximate to the conduit in the opening to control a pressure in the opening.

3834. The method of claim 3812, further comprising flowing a corrosion inhibiting fluid through a perforated tube disposed proximate to the conduit in the opening.

3835. The method of claim 3812, wherein the conduit comprises a first section and a second section, wherein a thickness of the first section is greater than a thickness of the second section such that heat radiated from the first conductor to the section along the first section of the conduit is less than heat radiated from the first conductor to the section along the second section of the conduit.

3836. The method of claim 3812, further comprising flowing an oxidizing fluid through an orifice in the conduit.

3837. The method of claim 3812, further comprising disposing a perforated tube proximate to the conduit and flowing an oxidizing fluid through the perforated tube.

3838. The method of claim 3812, further comprising heating at least the portion of the formation to substantially pyrolyze at least some of the carbon within the formation.

3839. A system configured to heat a coal formation, comprising:

at least one conductor disposed in a conduit, wherein the conduit is disposed within an opening in the formation, and wherein at least the one conductor is configured to provide heat to at least a first portion of the formation during use;

at least one sliding connector, wherein at least the one sliding connector is coupled to at least the one conductor, wherein at least the one sliding connector is configured to provide heat during use, and wherein heat provided by at least the one sliding connector is substantially less than the heat provided by at least the one conductor during use; and

wherein the system is configured to allow heat to transfer from at least the one conductor to a section of the formation during use.

3840. The system of claim 3839, wherein at least the one conductor is further configured to generate heat during application of an electrical current to at least the one conductor.

3841. The system of claim 3839, wherein at least the one conductor comprises a pipe.

3842. The system of claim 3839, wherein at least the one conductor comprises stainless steel.

3843. The system of claim 3839, wherein the conduit comprises stainless steel.

3844. The system of claim 3839, further comprising a centralizer configured to maintain a location of at least the one conductor within the conduit.

3845. The system of claim 3839, further comprising a centralizer configured to maintain a location of at least the one conductor within the conduit, wherein the centralizer comprises ceramic material.

3846. The system of claim 3839, further comprising a centralizer configured to maintain a location of at least the one conductor within the conduit, wherein the centralizer comprises ceramic material and stainless steel.

3847. The system of claim 3839, wherein the opening comprises a diameter of at least approximately 5 cm.

3848. The system of claim 3839, further comprising a lead-in conductor coupled to at least the one conductor, wherein the lead-in conductor comprises a low resistance conductor configured to generate substantially no heat.

3849. The system of claim 3839, further comprising a lead-in conductor coupled to at least the one conductor, wherein the lead-in conductor comprises copper.

3850. The system of claim 3839, wherein the conduit comprises a first section and a second section, wherein a thickness of the first section is greater than a thickness of the second section such that heat radiated from the first conductor to the section along the first section of the conduit is less than heat radiated from the first conductor to the section along the second section of the conduit.

3851. The system of claim 3839, further comprising a fluid disposed within the conduit, wherein the fluid is configured to maintain a pressure within the conduit to substantially inhibit deformation of the conduit during use.

3852. The system of claim 3839, further comprising a thermally conductive fluid disposed within the conduit.

3853. The system of claim 3839, further comprising a thermally conductive fluid disposed within the conduit, wherein the thermally conductive fluid comprises helium.

3854. The system of claim 3839, further comprising a fluid disposed within the conduit, wherein the fluid is configured to substantially inhibit arcing between at least the one conductor and the conduit during use.

3855. The system of claim 3839, further comprising a tube disposed within the opening external to the conduit, wherein the tube is configured to remove vapor produced from at least the heated portion of the formation such that a pressure balance is maintained between the conduit and the opening to substantially inhibit deformation of the conduit during use.

3856. The system of claim 3839, wherein at least the one conductor is further configured to generate radiant heat of approximately 650 W/m to approximately 1650 W/m during use.

3857. The system of claim 3839, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3858. The system of claim 3839, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3859. The system of claim 3839, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3860. The system of claim 3839, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3861. The system of claim 3839, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing

and the opening, and wherein the packing material is further configured to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3862. The system of claim 3839, further comprising an overburden casing coupled to the opening and a substantially low resistance conductor disposed within the overburden casing, wherein the substantially low resistance conductor is electrically coupled to at least the one conductor.

3863. The system of claim 3839, further comprising an overburden casing coupled to the opening and a substantially low resistance conductor disposed within the overburden casing, wherein the substantially low resistance conductor is electrically coupled to at least the one conductor, and wherein the substantially low resistance conductor comprises carbon steel.

3864. The system of claim 3839, further comprising an overburden casing coupled to the opening and a substantially low resistance conductor disposed within the overburden casing and a centralizer configured to support the substantially low resistance conductor within the overburden casing.

3865. The system of claim 3839, wherein the heated section of the formation is substantially pyrolyzed.

3866. A system configurable to heat a coal formation, comprising:

at least one conductor configurable to be disposed in a conduit, wherein the conduit is configurable to be disposed within an opening in the formation, and wherein at least the one conductor is further configurable to provide heat to at least a first portion of the formation during use;

at least one sliding connector, wherein at least the one sliding connector is configurable to be coupled to at least the one conductor, wherein at least the one sliding connector is further configurable to provide heat during use, and wherein heat provided

by at least the one sliding connector is substantially less than the heat provided by at least the one conductor during use; and

wherein the system is configurable to allow heat to transfer from at least the one conductor to a section of the formation during use.

3867. The system of claim 3866, wherein at least the one conductor is further configurable to generate heat during application of an electrical current to at least the one conductor.

3868. The system of claim 3866, wherein at least the one conductor comprises a pipe.

3869. The system of claim 3866, wherein at least the one conductor comprises stainless steel.

3870. The system of claim 3866, wherein the conduit comprises stainless steel.

3871. The system of claim 3866, further comprising a centralizer configurable to maintain a location of at least the one conductor within the conduit.

3872. The system of claim 3866, further comprising a centralizer configurable to maintain a location of at least the one conductor within the conduit, wherein the centralizer comprises ceramic material.

3873. The system of claim 3866, further comprising a centralizer configurable to maintain a location of at least the one conductor within the conduit, wherein the centralizer comprises ceramic material and stainless steel.

3874. The system of claim 3866, wherein the opening comprises a diameter of at least approximately 5 cm.

3875. The system of claim 3866, further comprising a lead-in conductor coupled to at least the one conductor, wherein the lead-in conductor comprises a low resistance conductor configurable to generate substantially no heat.

3876. The system of claim 3866, further comprising a lead-in conductor coupled to at least the one conductor, wherein the lead-in conductor comprises copper.

3877. The system of claim 3866, wherein the conduit comprises a first section and a second section, wherein a thickness of the first section is greater than a thickness of the second section such that heat radiated from the first conductor to the section along the first section of the conduit is less than heat radiated from the first conductor to the section along the second section of the conduit.

3878. The system of claim 3866, further comprising a fluid disposed within the conduit, wherein the fluid is configurable to maintain a pressure within the conduit to substantially inhibit deformation of the conduit during use.

3879. The system of claim 3866, further comprising a thermally conductive fluid disposed within the conduit.

3880. The system of claim 3866, further comprising a thermally conductive fluid disposed within the conduit, wherein the thermally conductive fluid comprises helium.

3881. The system of claim 3866, further comprising a fluid disposed within the conduit, wherein the fluid is configurable to substantially inhibit arcing between at least the one conductor and the conduit during use.

3882. The system of claim 3866, further comprising a tube disposed within the opening external to the conduit, wherein the tube is configurable to remove vapor produced from at least the heated portion of the formation such that a pressure balance is maintained

between the conduit and the opening to substantially inhibit deformation of the conduit during use.

3883. The system of claim 3866, wherein at least the one conductor is further configurable to generate radiant heat of approximately 650 W/m to approximately 1650 W/m during use.

3884. The system of claim 3866, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3885. The system of claim 3866, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3886. The system of claim 3866, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3887. The system of claim 3866, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3888. The system of claim 3866, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is further configurable to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3889. The system of claim 3866, further comprising an overburden casing coupled to the opening and a substantially low resistance conductor disposed within the overburden casing, wherein the substantially low resistance conductor is electrically coupled to at least the one conductor.

3890. The system of claim 3866, further comprising an overburden casing coupled to the opening and a substantially low resistance conductor disposed within the overburden casing, wherein the substantially low resistance conductor is electrically coupled to at least the one conductor, and wherein the substantially low resistance conductor comprises carbon steel.

3891. The system of claim 3866, further comprising an overburden casing coupled to the opening and a substantially low resistance conductor disposed within the overburden casing and a centralizer configurable to support the substantially low resistance conductor within the overburden casing.

3892. The system of claim 3866, wherein the heated section of the formation is substantially pyrolyzed.

3893. An in situ method for heating a coal formation, comprising:

applying an electrical current to at least one conductor and at least one sliding connector to provide heat to at least a portion of the formation, wherein at least the one conductor and at least the one sliding connector are disposed within a conduit, and wherein heat provided by at least the one conductor is substantially greater than heat provided by at least the one sliding connector; and

allowing the heat to transfer from at least the one conductor and at least the one sliding connector to a section of the formation.

3894. The method of claim 3893, wherein at least the one conductor comprises a pipe.

3895. The method of claim 3893, wherein at least the one conductor comprises stainless steel.

3896. The method of claim 3893, wherein the conduit comprises stainless steel.

3897. The method of claim 3893, further comprising maintaining a location of at least the one conductor in the conduit with a centralizer.

3898. The method of claim 3893, further comprising maintaining a location of at least the one conductor in the conduit with a centralizer, wherein the centralizer comprises ceramic material.

3899. The method of claim 3893, further comprising maintaining a location of at least the one conductor in the conduit with a centralizer, wherein the centralizer comprises ceramic material and stainless steel.

3900. The method of claim 3893, wherein the provided heat comprises approximately 650 W/m to approximately 1650 W/m.

3901. The method of claim 3893, further comprising determining a temperature distribution in the conduit using an electromagnetic signal provided to the conduit.

3902. The method of claim 3893, further comprising monitoring the applied electrical current.

3903. The method of claim 3893, further comprising monitoring a voltage applied to at least the one conductor.

3904. The method of claim 3893, further comprising monitoring a temperature in the conduit with at least one thermocouple.

3905. The method of claim 3893, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3906. The method of claim 3893, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3907. The method of claim 3893, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3908. The method of claim 3893, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3909. The method of claim 3893, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the method further comprises inhibiting a flow of fluid between the opening and the overburden casing with a packing material.

3910. The method of claim 3893, further comprising coupling an overburden casing to the opening, wherein a substantially low resistance conductor is disposed within the overburden casing, and wherein the substantially low resistance conductor is electrically coupled to at least the one conductor.

3911. The method of claim 3893, further comprising coupling an overburden casing to the opening, wherein a substantially low resistance conductor is disposed within the overburden casing, wherein the substantially low resistance conductor is electrically

coupled to at least the one conductor, and wherein the substantially low resistance conductor comprises carbon steel.

3912. The method of claim 3893, further comprising coupling an overburden casing to the opening, wherein a substantially low resistance conductor is disposed within the overburden casing, wherein the substantially low resistance conductor is electrically coupled to at least the one conductor, and wherein the method further comprises maintaining a location of the substantially low resistance conductor in the overburden casing with a centralizer support.

3913. The method of claim 3893, further comprising electrically coupling a lead-in conductor to at least the one conductor, wherein the lead-in conductor comprises a low resistance conductor configured to generate substantially no heat.

3914. The method of claim 3893, further comprising electrically coupling a lead-in conductor to at least the one conductor, wherein the lead-in conductor comprises copper.

3915. The method of claim 3893, further comprising maintaining a sufficient pressure between the conduit and the formation to substantially inhibit deformation of the conduit.

3916. The method of claim 3893, further comprising providing a thermally conductive fluid within the conduit.

3917. The method of claim 3893, further comprising providing a thermally conductive fluid within the conduit, wherein the thermally conductive fluid comprises helium.

3918. The method of claim 3893, further comprising inhibiting arcing between the conductor and the conduit with a fluid disposed within the conduit.

3919. The method of claim 3893, further comprising removing a vapor from the opening using a perforated tube disposed proximate to the conduit in the opening to control a pressure in the opening.

3920. The method of claim 3893, further comprising flowing a corrosion inhibiting fluid through a perforated tube disposed proximate to the conduit in the opening.

3921. The method of claim 3893, further comprising flowing an oxidizing fluid through an orifice in the conduit.

3922. The method of claim 3893, further comprising disposing a perforated tube proximate to the conduit and flowing an oxidizing fluid through the perforated tube.

3923. The method of claim 3893, further comprising heating at least the portion of the formation to substantially pyrolyze at least some of the carbon within the formation.

3924. A system configured to heat a coal formation, comprising:

at least one elongated member disposed within an opening in the formation, wherein at least the one elongated member is configured to provide heat to at least a portion of the formation during use; and

wherein the system is configured to allow heat to transfer from at least the one elongated member to a section of the formation during use.

3925. The system of claim 3924, wherein at least the one elongated member comprises stainless steel.

3926. The system of claim 3924, wherein at least the one elongated member is further configured to generate heat during application of an electrical current to at least the one elongated member.

3927. The system of claim 3924, further comprising a support member coupled to at least the one elongated member, wherein the support member is configured to support at least the one elongated member.

3928. The system of claim 3924, further comprising a support member coupled to at least the one elongated member, wherein the support member is configured to support at least the one elongated member, and wherein the support member comprises openings.

3929. The system of claim 3924, further comprising a support member coupled to at least the one elongated member, wherein the support member is configured to support at least the one elongated member, wherein the support member comprises openings, wherein the openings are configured to flow a fluid along a length of at least the one elongated member during use, and wherein the fluid is configured to substantially inhibit carbon deposition on or proximate to at least the one elongated member during use.

3930. The system of claim 3924, further comprising a tube disposed in the opening, wherein the tube comprises openings, wherein the openings are configured to flow a fluid along a length of at least the one elongated member during use, and wherein the fluid is configured to substantially inhibit carbon deposition on or proximate to at least the one elongated member during use.

3931. The system of claim 3924, further comprising a centralizer coupled to at least the one elongated member, wherein the centralizer is configured to electrically isolate at least the one elongated member.

3932. The system of claim 3924, further comprising a centralizer coupled to at least the one elongated member and a support member coupled to at least the one elongated member, wherein the centralizer is configured to maintain a location of at least the one elongated member on the support member.

3933. The system of claim 3924, wherein the opening comprises a diameter of at least approximately 5 cm.

3934. The system of claim 3924, further comprising a lead-in conductor coupled to at least the one elongated member, wherein the lead-in conductor comprises a low resistance conductor configured to generate substantially no heat.

3935. The system of claim 3924, further comprising a lead-in conductor coupled to at least the one elongated member, wherein the lead-in conductor comprises a rubber insulated conductor.

3936. The system of claim 3924, further comprising a lead-in conductor coupled to at least the one elongated member, wherein the lead-in conductor comprises copper wire.

3937. The system of claim 3924, further comprising a lead-in conductor coupled to at least the one elongated member with a cold pin transition conductor.

3938. The system of claim 3924, further comprising a lead-in conductor coupled to at least the one elongated member with a cold pin transition conductor, wherein the cold pin transition conductor comprises a substantially low resistance insulated conductor.

3939. The system of claim 3924, wherein at least the one elongated member is arranged in a series electrical configuration.

3940. The system of claim 3924, wherein at least the one elongated member is arranged in a parallel electrical configuration.

3941. The system of claim 3924, wherein at least the one elongated member is configured to generate radiant heat of approximately 650 W/m to approximately 1650 W/m during use.

3942. The system of claim 3924, further comprising a perforated tube disposed in the opening external to at least the one elongated member, wherein the perforated tube is configured to remove vapor from the opening to control a pressure in the opening during use.

3943. The system of claim 3924, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3944. The system of claim 3924, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3945. The system of claim 3924, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3946. The system of claim 3924, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3947. The system of claim 3924, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

3948. The system of claim 3924, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing

and the opening, and wherein the packing material is further configured to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3949. The system of claim 3924, wherein the heated section of the formation is substantially pyrolyzed.

3950. A system configurable to heat a coal formation, comprising:

at least one elongated member configurable to be disposed within an opening in the formation, wherein at least the one elongated member is further configurable to provide heat to at least a portion of the formation during use; and

wherein the system is configurable to allow heat to transfer from at least the one elongated member to a section of the formation during use.

3951. The system of claim 3950, wherein at least the one elongated member comprises stainless steel.

3952. The system of claim 3950, wherein at least the one elongated member is further configurable to generate heat during application of an electrical current to at least the one elongated member.

3953. The system of claim 3950, further comprising a support member coupled to at least the one elongated member, wherein the support member is configurable to support at least the one elongated member.

3954. The system of claim 3950, further comprising a support member coupled to at least the one elongated member, wherein the support member is configurable to support at least the one elongated member, and wherein the support member comprises openings.

3955. The system of claim 3950, further comprising a support member coupled to at least the one elongated member, wherein the support member is configurable to support at least the one elongated member, wherein the support member comprises openings,

wherein the openings are configurable to flow a fluid along a length of at least the one elongated member during use, and wherein the fluid is configurable to substantially inhibit carbon deposition on or proximate to at least the one elongated member during use.

3956. The system of claim 3950, further comprising a tube disposed in the opening, wherein the tube comprises openings, wherein the openings are configurable to flow a fluid along a length of at least the one elongated member during use, and wherein the fluid is configurable to substantially inhibit carbon deposition on or proximate to at least the one elongated member during use.

3957. The system of claim 3950, further comprising a centralizer coupled to at least the one elongated member, wherein the centralizer is configurable to electrically isolate at least the one elongated member.

3958. The system of claim 3950, further comprising a centralizer coupled to at least the one elongated member and a support member coupled to at least the one elongated member, wherein the centralizer is configurable to maintain a location of at least the one elongated member on the support member.

3959. The system of claim 3950, wherein the opening comprises a diameter of at least approximately 5 cm.

3960. The system of claim 3950, further comprising a lead-in conductor coupled to at least the one elongated member, wherein the lead-in conductor comprises a low resistance conductor configurable to generate substantially no heat.

3961. The system of claim 3950, further comprising a lead-in conductor coupled to at least the one elongated member, wherein the lead-in conductor comprises a rubber insulated conductor.

3962. The system of claim 3950, further comprising a lead-in conductor coupled to at least the one elongated member, wherein the lead-in conductor comprises copper wire.

3963. The system of claim 3950, further comprising a lead-in conductor coupled to at least the one elongated member with a cold pin transition conductor.

3964. The system of claim 3950, further comprising a lead-in conductor coupled to at least the one elongated member with a cold pin transition conductor, wherein the cold pin transition conductor comprises a substantially low resistance insulated conductor.

3965. The system of claim 3950, wherein at least the one elongated member is arranged in a series electrical configuration.

3966. The system of claim 3950, wherein at least the one elongated member is arranged in a parallel electrical configuration.

3967. The system of claim 3950, wherein at least the one elongated member is configurable to generate radiant heat of approximately 650 W/m to approximately 1650 W/m during use.

3968. The system of claim 3950, further comprising a perforated tube disposed in the opening external to at least the one elongated member, wherein the perforated tube is configurable to remove vapor from the opening to control a pressure in the opening during use.

3969. The system of claim 3950, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3970. The system of claim 3950, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

3971. The system of claim 3950, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

3972. The system of claim 3950, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

3973. The system of claim 3950, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

3974. The system of claim 3950, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is further configurable to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

3975. The system of claim 3950, wherein the heated section of the formation is substantially pyrolyzed.

3976. An in situ method for heating a coal formation, comprising:

applying an electrical current to at least one elongated member to provide heat to at least a portion of the formation, wherein at least the one elongated member is disposed within an opening of the formation; and

allowing heat to transfer from at least the one elongated member to a section of the formation.

3977. The method of claim 3976, wherein at least the one elongated member comprises a metal strip.

3978. The method of claim 3976, wherein at least the one elongated member comprises a metal rod.

3979. The method of claim 3976, wherein at least the one elongated member comprises stainless steel.

3980. The method of claim 3976, further comprising supporting at least the one elongated member on a center support member.

3981. The method of claim 3976, further comprising supporting at least the one elongated member on a center support member, wherein the center support member comprises a tube.

3982. The method of claim 3976, further comprising electrically isolating at least the one elongated member with a centralizer.

3983. The method of claim 3976, further comprising laterally spacing at least the one elongated member with a centralizer.

3984. The method of claim 3976, further comprising electrically coupling at least the one elongated member in a series configuration.

3985. The method of claim 3976, further comprising electrically coupling at least the one elongated member in a parallel configuration.

3986. The method of claim 3976, wherein the provided heat comprises approximately 650 W/m to approximately 1650 W/m.

3987. The method of claim 3976, further comprising determining a temperature distribution in at least the one elongated member using an electromagnetic signal provided to at least the one elongated member.

3988. The method of claim 3976, further comprising monitoring the applied electrical current.

3989. The method of claim 3976, further comprising monitoring a voltage applied to at least the one elongated member.

3990. The method of claim 3976, further comprising monitoring a temperature in at least the one elongated member with at least one thermocouple.

3991. The method of claim 3976, further comprising supporting at least the one elongated member on a center support member, wherein the center support member comprises openings, the method further comprising flowing an oxidizing fluid through the openings to substantially inhibit carbon deposition proximate to or on at least the one elongated member.

3992. The method of claim 3976, further comprising flowing an oxidizing fluid through a tube disposed proximate to at least the one elongated member to substantially inhibit carbon deposition proximate to or on at least the one elongated member.

3993. The method of claim 3976, further comprising flowing an oxidizing fluid through an opening in at least the one elongated member to substantially inhibit carbon deposition proximate to or on at least the one elongated member.

3994. The method of claim 3976, further comprising electrically coupling a lead-in conductor to at least the one elongated member, wherein the lead-in conductor comprises a low resistance conductor configured to generate substantially no heat.

3995. The method of claim 3976, further comprising electrically coupling a lead-in conductor to at least the one elongated member using a cold pin transition conductor.

3996. The method of claim 3976, further comprising electrically coupling a lead-in conductor to at least the one elongated member using a cold pin transition conductor, wherein the cold pin transition conductor comprises a substantially low resistance insulated conductor.

3997. The method of claim 3976, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation.

3998. The method of claim 3976, further comprising coupling an overburden casing to the opening, wherein the overburden casing comprises steel.

3999. The method of claim 3976, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in cement.

4000. The method of claim 3976, further comprising coupling an overburden casing to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

4001. The method of claim 3976, further comprising coupling an overburden casing to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the method further comprises inhibiting a flow of fluid between the opening and the overburden casing with the packing material.

4002. The method of claim 3976, further comprising heating at least the portion of the formation to substantially pyrolyze at least some of the carbon within the formation.

4003. A system configured to heat a coal formation, comprising:

at least one elongated member disposed within an opening in the formation, wherein at least the one elongated member is configured to provide heat to at least a portion of the formation during use;

an oxidizing fluid source;

a conduit disposed within the opening, wherein the conduit is configured to provide an oxidizing fluid from the oxidizing fluid source to the opening during use, and wherein the oxidizing fluid is selected to substantially inhibit carbon deposition on or proximate to at least the one elongated member during use; and

wherein the system is configured to allow heat to transfer from at least the one elongated member to a section of the formation during use.

4004. The system of claim 4003, wherein at least the one elongated member comprises stainless steel.

4005. The system of claim 4003, wherein at least the one elongated member is further configured to generate heat during application of an electrical current to at least the one elongated member.

4006. The system of claim 4003, wherein at least the one elongated member is coupled to the conduit, wherein the conduit is further configured to support at least the one elongated member.

4007. The system of claim 4003, wherein at least the one elongated member is coupled to the conduit, wherein the conduit is further configured to support at least the one elongated member, and wherein the conduit comprises openings.

4008. The system of claim 4003, further comprising a centralizer coupled to at least the one elongated member and the conduit, wherein the centralizer is configured to electrically isolate at least the one elongated member from the conduit.

4009. The system of claim 4003, further comprising a centralizer coupled to at least the one elongated member and the conduit, wherein the centralizer is configured to maintain a location of at least the one elongated member on the conduit.

4010. The system of claim 4003, wherein the opening comprises a diameter of at least approximately 5 cm.

4011. The system of claim 4003, further comprising a lead-in conductor coupled to at least the one elongated member, wherein the lead-in conductor comprises a low resistance conductor configured to generate substantially no heat.

4012. The system of claim 4003, further comprising a lead-in conductor coupled to at least the one elongated member, wherein the lead-in conductor comprises a rubber insulated conductor.

4013. The system of claim 4003, further comprising a lead-in conductor coupled to at least the one elongated member, wherein the lead-in conductor comprises copper wire.

4014. The system of claim 4003, further comprising a lead-in conductor coupled to at least the one elongated member with a cold pin transition conductor.

4015. The system of claim 4003, further comprising a lead-in conductor coupled to at least the one elongated member with a cold pin transition conductor, wherein the cold pin transition conductor comprises a substantially low resistance insulated conductor.

4016. The system of claim 4003, wherein at least the one elongated member is arranged in a series electrical configuration.

4017. The system of claim 4003, wherein at least the one elongated member is arranged in a parallel electrical configuration.

4018. The system of claim 4003, wherein at least the one elongated member is configured to generate radiant heat of approximately 650 W/m to approximately 1650 W/m during use.

4019. The system of claim 4003, further comprising a perforated tube disposed in the opening external to at least the one elongated member, wherein the perforated tube is configured to remove vapor from the opening to control a pressure in the opening during use.

4020. The system of claim 4003, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

4021. The system of claim 4003, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

4022. The system of claim 4003, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

4023. The system of claim 4003, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

4024. The system of claim 4003, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

4025. The system of claim 4003, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is further configured to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

4026. The system of claim 4003, wherein the heated section of the formation is substantially pyrolyzed.

4027. A system configurable to heat a coal formation, comprising:

at least one elongated member configurable to be disposed within an opening in the formation, wherein at least the one elongated member is further configurable to provide heat to at least a portion of the formation during use;

a conduit configurable to be disposed within the opening, wherein the conduit is further configurable to provide an oxidizing fluid from the oxidizing fluid source to the opening during use, and wherein the system is configurable to allow the oxidizing fluid to substantially inhibit carbon deposition on or proximate to at least the one elongated member during use; and

wherein the system is further configurable to allow heat to transfer from at least the one elongated member to a section of the formation during use.

4028. The system of claim 4027, wherein at least the one elongated member comprises stainless steel.

4029. The system of claim 4027, wherein at least the one elongated member is further configurable to generate heat during application of an electrical current to at least the one elongated member.

4030. The system of claim 4027, wherein at least the one elongated member is coupled to the conduit, wherein the conduit is further configurable to support at least the one elongated member.

4031. The system of claim 4027, wherein at least the one elongated member is coupled to the conduit, wherein the conduit is further configurable to support at least the one elongated member, and wherein the conduit comprises openings.

4032. The system of claim 4027, further comprising a centralizer coupled to at least the one elongated member and the conduit, wherein the centralizer is configurable to electrically isolate at least the one elongated member from the conduit.

4033. The system of claim 4027, further comprising a centralizer coupled to at least the one elongated member and the conduit, wherein the centralizer is configurable to maintain a location of at least the one elongated member on the conduit.

4034. The system of claim 4027, wherein the opening comprises a diameter of at least approximately 5 cm.

4035. The system of claim 4027, further comprising a lead-in conductor coupled to at least the one elongated member, wherein the lead-in conductor comprises a low resistance conductor configurable to generate substantially no heat.

4036. The system of claim 4027, further comprising a lead-in conductor coupled to at least the one elongated member, wherein the lead-in conductor comprises a rubber insulated conductor.

4037. The system of claim 4027, further comprising a lead-in conductor coupled to at least the one elongated member, wherein the lead-in conductor comprises copper wire.

4038. The system of claim 4027, further comprising a lead-in conductor coupled to at least the one elongated member with a cold pin transition conductor.

4039. The system of claim 4027, further comprising a lead-in conductor coupled to at least the one elongated member with a cold pin transition conductor, wherein the cold pin transition conductor comprises a substantially low resistance insulated conductor.

4040. The system of claim 4027, wherein at least the one elongated member is arranged in a series electrical configuration.

4041. The system of claim 4027, wherein at least the one elongated member is arranged in a parallel electrical configuration.

4042. The system of claim 4027, wherein at least the one elongated member is configurable to generate radiant heat of approximately 650 W/m to approximately 1650 W/m during use.

4043. The system of claim 4027, further comprising a perforated tube disposed in the opening external to at least the one elongated member, wherein the perforated tube is configurable to remove vapor from the opening to control a pressure in the opening during use.

4044. The system of claim 4027, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation.

4045. The system of claim 4027, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

4046. The system of claim 4027, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

4047. The system of claim 4027, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the opening.

4048. The system of claim 4027, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material comprises cement.

4049. The system of claim 4027, further comprising an overburden casing coupled to the opening, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the packing material is further configurable to substantially inhibit a flow of fluid between the opening and the overburden casing during use.

4050. The system of claim 4027, wherein the heated section of the formation is substantially pyrolyzed.

4051. An in situ method for heating a coal formation, comprising:

applying an electrical current to at least one elongated member to provide heat to at least a portion of the formation, wherein at least the one elongated member is disposed within an opening in the formation;

providing an oxidizing fluid to at least the one elongated member to substantially inhibit carbon deposition on or proximate to at least the one elongated member; and

allowing heat to transfer from at least the one elongated member to a section of the formation.

4052. The method of claim 4051, wherein at least the one elongated member comprises a metal strip.

4053. The method of claim 4051, wherein at least the one elongated member comprises a metal rod.

4054. The method of claim 4051, wherein at least the one elongated member comprises stainless steel.

4055. The method of claim 4051, further comprising supporting at least the one elongated member on a center support member.

4056. The method of claim 4051, further comprising supporting at least the one elongated member on a center support member, wherein the center support member comprises a tube.

4057. The method of claim 4051, further comprising electrically isolating at least the one elongated member with a centralizer.

4058. The method of claim 4051, further comprising laterally spacing at least the one elongated member with a centralizer.

4059. The method of claim 4051, further comprising electrically coupling at least the one elongated member in a series configuration.

4060. The method of claim 4051, further comprising electrically coupling at least the one elongated member in a parallel configuration.

4061. The method of claim 4051, wherein the provided heat comprises approximately 650 W/m to approximately 1650 W/m.

4062. The method of claim 4051, further comprising determining a temperature distribution in at least the one elongated member using an electromagnetic signal provided to at least the one elongated member.

4063. The method of claim 4051, further comprising monitoring the applied electrical current.

4064. The method of claim 4051, further comprising monitoring a voltage applied to at least the one elongated member.

4065. The method of claim 4051, further comprising monitoring a temperature in at least the one elongated member with at least one thermocouple.

4066. The method of claim 4051, further comprising supporting at least the one elongated member on a center support member, wherein the center support member comprises openings, wherein providing the oxidizing fluid to at least the one elongated member comprises flowing the oxidizing fluid through the openings in the center support member.

4067. The method of claim 4051, wherein providing the oxidizing fluid to at least the one elongated member comprises flowing the oxidizing fluid through orifices in a tube disposed in the opening proximate to at least the one elongated member.

4068. The method of claim 4051, further comprising electrically coupling a lead-in conductor to at least the one elongated member, wherein the lead-in conductor comprises a low resistance conductor configured to generate substantially no heat.

4069. The method of claim 4051, further comprising electrically coupling a lead-in conductor to at least the one elongated member using a cold pin transition conductor.

4070. The method of claim 4051, further comprising electrically coupling a lead-in conductor to at least the one elongated member using a cold pin transition conductor, wherein the cold pin transition conductor comprises a substantially low resistance insulated conductor.

4071. The method of claim 4051, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in an overburden of the formation.

4072. The method of claim 4051, further comprising coupling an overburden casing to the opening, wherein the overburden casing comprises steel.

4073. The method of claim 4051, further comprising coupling an overburden casing to the opening, wherein the overburden casing is disposed in cement.

4074. The method of claim 4051, further comprising coupling an overburden casing to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening.

4075. The method of claim 4051, further comprising coupling an overburden casing to the opening, wherein a packing material is disposed at a junction of the overburden casing and the opening, and wherein the method further comprises inhibiting a flow of fluid between the opening and the overburden casing with the packing material.

4076. The method of claim 4051, further comprising heating at least the portion of the formation to substantially pyrolyze at least some of the carbon within the formation.

4077. An in situ method for heating a coal formation, comprising:

oxidizing a fuel fluid in a heater;

providing at least a portion of the oxidized fuel fluid into a conduit disposed in an opening of the formation;

allowing heat to transfer from the oxidized fuel fluid to a section of the formation; and

allowing additional heat to transfer from an electric heater disposed in the opening to the section of the formation, wherein heat is allowed to transfer substantially uniformly along a length of the opening.

4078. The method of claim 4077, wherein providing at least the portion of the oxidized fuel fluid into the opening comprises flowing the oxidized fuel fluid through a perforated conduit disposed in the opening.

4079. The method of claim 4077, wherein providing at least the portion of the oxidized fuel fluid into the opening comprises flowing the oxidized fuel fluid through a perforated conduit disposed in the opening, the method further comprising removing an exhaust fluid through the opening.

4080. The method of claim 4077, further comprising initiating oxidation of the fuel fluid in the heater with a flame.

4081. The method of claim 4077, further comprising removing the oxidized fuel fluid through the conduit.

4082. The method of claim 4077, further comprising removing the oxidized fuel fluid through the conduit and providing the removed oxidized fuel fluid to at least one additional heater disposed in the formation.

4083. The method of claim 4077, wherein the conduit comprises an insulator disposed on a surface of the conduit, the method further comprising tapering a thickness of the insulator such that heat is allowed to transfer substantially uniformly along a length of the conduit.

4084. The method of claim 4077, wherein the electric heater is an insulated conductor.

4085. The method of claim 4077, wherein the electric heater is a conductor disposed in the conduit.

4086. The method of claim 4077, wherein the electric heater is an elongated conductive member.

4087. A system configured to heat a coal formation, comprising:

one or more heat sources disposed within one or more open wellbores in the formation, wherein the one or more heat sources are configured to provide heat to at least a portion of the formation during use; and

wherein the system is configured to allow heat to transfer from the one or more heat sources to a selected section of the formation during use.

4088. The system of claim 4087, wherein the one or more heat sources comprise at least two heat sources. and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

4089. The system of claim 4087, wherein the one or more heat sources comprise electrical heaters.

4090. The system of claim 4087, wherein the one or more heat sources comprise surface burners.

4091. The system of claim 4087, wherein the one or more heat sources comprise flameless distributed combustors.

4092. The system of claim 4087, wherein the one or more heat sources comprise natural distributed combustors.

4093. The system of claim 4087, wherein the one or more open wellbores comprise a diameter of at least approximately 5 cm.

4094. The system of claim 4087, further comprising an overburden casing coupled to at least one of the one or more open wellbores, wherein the overburden casing is disposed in an overburden of the formation.

4095. The system of claim 4087, further comprising an overburden casing coupled to at least one of the one or more open wellbores, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing comprises steel.

4096. The system of claim 4087, further comprising an overburden casing coupled to at least one of the one or more open wellbores, wherein the overburden casing is disposed in an overburden of the formation, and wherein the overburden casing is further disposed in cement.

4097. The system of claim 4087, further comprising an overburden casing coupled to at least one of the one or more open wellbores, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the at least one of the one or more open wellbores.

4098. The system of claim 4087, further comprising an overburden casing coupled to at least one of the one or more open wellbores, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of

the overburden casing and the at least one of the one or more open wellbores, and wherein the packing material is configured to substantially inhibit a flow of fluid between at least one of the one or more open wellbores and the overburden casing during use.

4099. The system of claim 4087, further comprising an overburden casing coupled to at least one of the one or more open wellbores, wherein the overburden casing is disposed in an overburden of the formation, wherein a packing material is disposed at a junction of the overburden casing and the at least one of the one or more open wellbores, and wherein the packing material comprises cement.

4100. The system of claim 4087, wherein the system is further configured to transfer heat such that the transferred heat can pyrolyze at least some hydrocarbons in the selected section.

4101. The system of claim 4087, further comprising a valve coupled to at least one of the one or more heat sources configured to control pressure within at least a majority of the selected section of the formation.

4102. The system of claim 4087, further comprising a valve coupled to a production well configured to control a pressure within at least a majority of the selected section of the formation.

4103. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least one portion of the formation, wherein the one or more heat sources are disposed within one or more open wellbores in the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation; and

producing a mixture from the formation.

4104. The method of claim 4103, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

4105. The method of claim 4103, wherein controlling formation conditions comprises maintaining a temperature within the selected section within a pyrolysis temperature range with a lower pyrolysis temperature of about 250 °C and an upper pyrolysis temperature of about 400 °C.

4106. The method of claim 4103, wherein the one or more heat sources comprise electrical heaters.

4107. The method of claim 4103, wherein the one or more heat sources comprise surface burners.

4108. The method of claim 4103, wherein the one or more heat sources comprise flameless distributed combustors.

4109. The method of claim 4103, wherein the one or more heat sources comprise natural distributed combustors.

4110. The method of claim 4103, wherein the one or more heat sources are suspended within the one or more open wellbores.

4111. The method of claim 4103, wherein a tube is disposed in at least one of the one or more open wellbores proximate to heat source, the method further comprising flowing a substantially constant amount a fluid into at least one of the one or more open wellbores through critical flow orifices in the tube.

4112. The method of claim 4103, wherein a perforated tube is disposed in at least one of the one or more open wellbores proximate to the heat source. the method further comprising flowing a corrosion inhibiting fluid into at least one of the open wellbores through the perforated tube.

4113. The method of claim 4103, further comprising coupling an overburden casing to at least one of the one or more open wellbores, wherein the overburden casing is disposed in an overburden of the formation.

4114. The method of claim 4103, further comprising coupling an overburden casing to at least one of the one or more open wellbores. wherein the overburden casing is disposed in an overburden of the formation. and wherein the overburden casing comprise steel.

4115. The method of claim 4103. further comprising coupling an overburden casing to at least one of the one or more open wellbores, wherein the overburden casing is disposed in an overburden of the formation. and wherein the overburden casing is further disposed in cement.

4116. The method of claim 4103, further comprising coupling an overburden casing to at least one of the one or more open wellbores, wherein the overburden casing is disposed in an overburden of the formation, and wherein a packing material is disposed at a junction of the overburden casing and the at least one of the one or more open wellbores.

4117. The method of claim 4103, further comprising coupling an overburden casing to at least one of the one or more open wellbores. wherein the overburden casing is disposed in an overburden of the formation, and wherein the method further comprises inhibiting a flow of fluid between the at least one of the one or more open wellbores and the overburden casing with a packing material.

4118. The method of claim 4103, further comprising heating at least the portion of the formation to substantially pyrolyze at least some of the carbon within the formation.

4119. The method of claim 4103, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

4120. The method of claim 4103, further comprising controlling a pressure with the wellbore.

4121. The method of claim 4103, further comprising controlling a pressure within at least a majority of the selected section of the formation with a valve coupled to at least one of the one or more heat sources.

4122. The method of claim 4103, further comprising controlling a pressure within at least a majority of the selected section of the formation with a valve coupled to a production well located in the formation.

4123. The method of claim 4103, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

4124. The method of claim 4103, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from the one or more heat sources, wherein the formation has an average heat capacity(C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

4125. The method of claim 4103, wherein allowing the heat to transfer from the one or more heat sources to the selected section comprises transferring heat substantially by conduction.

4126. The method of claim 4103, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

4127. The method of claim 4103, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

4128. The method of claim 4103, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

4129. The method of claim 4103, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

4130. The method of claim 4103, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the non-condensable hydrocarbons are olefins.

4131. The method of claim 4103, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

4132. The method of claim 4103, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

4133. The method of claim 4103, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

4134. The method of claim 4103, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

4135. The method of claim 4103, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

4136. The method of claim 4103, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

4137. The method of claim 4103, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

4138. The method of claim 4103, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

4139. The method of claim 4103, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen,

and wherein the hydrogen is greater than about 10 % by volume of the non-condensable component and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

4140. The method of claim 4103, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

4141. The method of claim 4103, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

4142. The method of claim 4103, further comprising controlling a pressure within at least a majority of the selected section of the formation.

4143. The method of claim 4103, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

4144. The method of claim 4103, further comprising controlling formation conditions such that the produced mixture comprises a partial pressure of H_2 within the mixture greater than about 0.5 bar.

4145. The method of claim 4144, wherein the partial pressure of H_2 is measured when the mixture is at a production well.

4146. The method of claim 4103, wherein controlling formation conditions comprises recirculating a portion of hydrogen from the mixture into the formation.

4147. The method of claim 4103, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

4148. The method of claim 4103, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

4149. The method of claim 4103, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

4150. The method of claim 4103, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

4151. The method of claim 4103, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

4152. The method of claim 4103, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

4153. The method of claim 4103, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for the production well.

4154. The method of claim 4103, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

4155. The method of claim 4103, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat

sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

4156. The method of claim 4103, further comprising separating the produced mixture into a gas stream and a liquid stream.

4157. The method of claim 4103, further comprising separating the produced mixture into a gas stream and a liquid stream and separating the liquid stream into an aqueous stream and a non-aqueous stream.

4158. The method of claim 4103, wherein the produced mixture comprises H_2S, the method further comprising separating a portion of the H_2S from non-condensable hydrocarbons.

4159. The method of claim 4103, wherein the produced mixture comprises CO_2, the method further comprising separating a portion of the CO_2 from non-condensable hydrocarbons.

4160. The method of claim 4103, wherein the mixture is produced from a production well, wherein the heating is controlled such that the mixture can be produced from the formation as a vapor.

4161. The method of claim 4103, wherein the mixture is produced from a production well, the method further comprising heating a wellbore of the production well to inhibit condensation of the mixture within the wellbore.

4162. The method of claim 4103, wherein the mixture is produced from a production well, wherein a wellbore of the production well comprises a heater element configured to heat the formation adjacent to the wellbore, and further comprising heating the formation with the heater element to produce the mixture, wherein the mixture comprises a large non-condensable hydrocarbon gas component and H_2.

4163. The method of claim 4103, wherein the selected section is heated to a minimum pyrolysis temperature of about 270 °C.

4164. The method of claim 4103, further comprising maintaining the pressure within the formation above about 2.0 bar absolute to inhibit production of fluids having carbon numbers above 25.

4165. The method of claim 4103, further comprising controlling pressure within the formation in a range from about atmospheric pressure to about 100 bar, as measured at a wellhead of a production well, to control an amount of condensable hydrocarbons within the produced mixture, wherein the pressure is reduced to increase production of condensable hydrocarbons, and wherein the pressure is increased to increase production of non-condensable hydrocarbons.

4166. The method of claim 4103, further comprising controlling pressure within the formation in a range from about atmospheric pressure to about 100 bar, as measured at a wellhead of a production well, to control an API gravity of condensable hydrocarbons within the produced mixture, wherein the pressure is reduced to decrease the API gravity, and wherein the pressure is increased to reduce the API gravity.

4167. A mixture produced from a portion of a coal formation, the mixture comprising:

an olefin content of less than about 10% by weight; and

an average carbon number less than about 35.

4168. The mixture of claim 4167, further comprising an average carbon number less than about 30.

4169. The mixture of claim 4167, further comprising an average carbon number less than about 25.

4170. The mixture of claim 4167, further comprising:

non-condensable hydrocarbons comprising hydrocarbons having carbon numbers of less than 5; and

wherein a weight ratio of the hydrocarbons having carbon numbers from 2 through 4, to methane, in the mixture is greater than approximately 1.

4171. The mixture of claim 4167, further comprising condensable hydrocarbons, wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen, wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

4172. The mixture of claim 4167, further comprising ammonia, wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

4173. The mixture of claim 4167, further comprising condensable hydrocarbons, wherein an olefin content of the condensable hydrocarbons is greater than about 0.1 % by weight of the condensable hydrocarbons, and wherein the olefin content of the condensable hydrocarbons is less than about 15 % by weight of the condensable hydrocarbons.

4174. The mixture of claim 4167, further comprising condensable hydrocarbons, wherein less than about 15 % by weight of the condensable hydrocarbons have a carbon number greater than about 25.

4175. The mixture of claim 4174, wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen, wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

4176. The mixture of claim 4173, further comprising condensable hydrocarbons, wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

4177. The mixture of claim 4167, further comprising:

non-condensable hydrocarbons comprising hydrocarbons having carbon numbers of less than about 5, wherein a weight ratio of the hydrocarbons having carbon number from 2 through 4, to methane, in the mixture is greater than approximately 1;

wherein the non-condensable hydrocarbons further comprise H_2, wherein greater than about 15 % by weight of the non-condensable hydrocarbons comprises H_2; and

condensable hydrocarbons, comprising:

oxygenated hydrocarbons, wherein greater than about 1.5 % by weight of the condensable hydrocarbons comprises oxygenated hydrocarbons; and

aromatic compounds, wherein greater than about 20 % by weight of the condensable hydrocarbons comprises aromatic compounds.

4178. The mixture of claim 4167, further comprising:

condensable hydrocarbons, wherein less than about 5 % by weight of the condensable hydrocarbons comprises hydrocarbons having a carbon number greater than about 25;

wherein the condensable hydrocarbons further comprise:

oxygenated hydrocarbons, wherein greater than about 5 % by weight of the condensable hydrocarbons comprises oxygenated hydrocarbons; and

aromatic compounds, wherein greater than about 30 % by weight of the condensable hydrocarbons comprises aromatic compounds; and

non-condensable hydrocarbons comprising H_2, wherein greater than about 15 % by weight of the non-condensable hydrocarbons comprises H_2.

4179. The mixture of claim 4167, further comprising a condensable mixture, comprising:

olefins, wherein about 0.1 % by weight to about 15 % by weight of the condensable mixture comprises olefins; and

asphaltenes, wherein less than about 0.1 % by weight of the condensable mixture comprises asphaltenes.

4180. The mixture of claim 4179, further comprising, oxygenated hydrocarbons, wherein less than about 15 % by weight of the condensable mixture comprises oxygenated hydrocarbons;

4181. The mixture of claim 4167, further comprising a condensable mixture, comprising:

olefins, wherein about 0.1 % by weight to about 2 % by weight of the condensable mixture comprises olefins; and

multi-ring aromatics, wherein less than about 2 % by weight of the condensable mixture comprises multi-ring aromatics with more than two rings.

4182. The mixture of claim 4180, further comprising oxygenated hydrocarbons, wherein greater than about 25 % by weight of the condensable mixture comprises oxygenated hydrocarbons.

4183. The mixture of claim 4167, further comprising:

non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise H_2, wherein greater than about 10 % by weight of the non-condensable hydrocarbons comprises H_2;

ammonia, wherein greater than about 0.5 % by weight of the mixture comprises ammonia; and

hydrocarbons, wherein a weight ratio of hydrocarbons having greater than about 2 carbon atoms, to methane, is greater than about 0.4.

4184. A mixture produced from a portion of a coal formation, the mixture, comprising:

non-condensable hydrocarbons comprising hydrocarbons having carbon numbers of less than 5; and

wherein a weight ratio of the hydrocarbons having carbon numbers from 2 through 4, to methane, in the mixture is greater than approximately 1.

4185. The mixture of claim 4184, further comprising condensable hydrocarbons, wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

4186. The mixture of claim 4184, wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

4187. The mixture of claim 4184, further comprising condensable hydrocarbons, wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

4188. The mixture of claim 4184, further comprising condensable hydrocarbons, wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

4189. The mixture of claim 4184, further comprising condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

4190. The mixture of claim 4184, further comprising condensable hydrocarbons, wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

4191. The mixture of claim 4184, further comprising condensable hydrocarbons, wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

4192. The mixture of claim 4184, further comprising condensable hydrocarbons, wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

4193. The mixture of claim 4184, further comprising condensable hydrocarbons, wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

4194. The mixture of claim 4184, further comprising condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise cycloalkanes.

4195. The mixture of claim 4184, wherein the non-condensable hydrocarbons further comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable hydrocarbons, and wherein the hydrogen is less than about 80 % by volume of the non-condensable hydrocarbons.

4196. The mixture of claim 4184, further comprising ammonia, wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

4197. The mixture of claim 4184, further comprising ammonia, wherein the ammonia is used to produce fertilizer.

4198. The mixture of claim 4184, further comprising condensable hydrocarbons, wherein less than about 15 weight % of the condensable hydrocarbons have a carbon number greater than approximately 25.

4199. The mixture of claim 4184, further comprising condensable hydrocarbons, wherein the condensable hydrocarbons comprise olefins, and wherein about 0.1 % to about 5 % by weight of the condensable hydrocarbons comprises olefins.

4200. The mixture of claim 4184, further comprising condensable hydrocarbons, wherein the condensable hydrocarbons comprises olefins, and wherein about 0.1 % to about 2.5 % by weight of the condensable hydrocarbons comprises olefins.

4201. The mixture of claim 4184, further comprising condensable hydrocarbons, wherein the condensable hydrocarbons comprise oxygenated hydrocarbons, and wherein greater than about 5 % by weight of the condensable hydrocarbons comprises oxygenated hydrocarbons.

4202. The mixture of claim 4184, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise H_2, and wherein greater than about 5 % by weight of the non-condensable hydrocarbons comprises H_2.

4203. The mixture of claim 4184, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise H_2, and wherein greater than about 15 % by weight of the non-condensable hydrocarbons comprises H_2.

4204. The mixture of claim 4184, wherein a weight ratio of hydrocarbons having greater than about 2 carbon atoms, to methane, is greater than about 0.3.

4205. A mixture produced from a portion of a coal formation, the mixture comprising:

non-condensable hydrocarbons comprising hydrocarbons having carbon numbers of less than 5, wherein a weight ratio of hydrocarbons having carbon numbers from 2 through 4, to methane, is greater than approximately 1; and

condensable hydrocarbons comprising oxygenated hydrocarbons, wherein greater than about 5 % by weight of the condensable component comprises oxygenated hydrocarbons.

4206. The mixture of claim 4205, wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

4207. The mixture of claim 4205, wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

4208. The mixture of claim 4205, wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

4209. The mixture of claim 4205, wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

4210. The mixture of claim 4205, wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

4211. The mixture of claim 4205, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

4212. The mixture of claim 4205, wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

4213. The mixture of claim 4205, wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

4214. The mixture of claim 4205, wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

4215. The mixture of claim 4205, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

4216. The mixture of claim 4205, wherein the non-condensable hydrocarbons comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable hydrocarbons, and wherein the hydrogen is less than about 80 % by volume of the non-condensable hydrocarbons.

4217. The mixture of claim 4205, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

4218. The mixture of claim 4205, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

4219. The mixture of claim 4205, wherein less than about 5 weight % of the condensable hydrocarbons in the mixture have a carbon number greater than approximately 25.

4220. The mixture of claim 4205, wherein the condensable hydrocarbons further comprise olefins, and wherein about 0.1 % to about 5 % by weight of the condensable hydrocarbons comprises olefins.

4221. The mixture of claim 4205, wherein the condensable hydrocarbons further comprise olefins, and wherein about 0.1 % to about 2.5 % by weight of the condensable hydrocarbons comprises olefins.

4222. The mixture of claim 4205, wherein the non-condensable hydrocarbons further comprise H_2, wherein greater than about 5 % by weight of the mixture comprises H_2.

4223. The mixture of claim 4205, wherein the non-condensable hydrocarbons further comprise H_2, wherein greater than about 15 % by weight of the mixture comprises H_2.

4224. The mixture of claim 4205, wherein a weight ratio of hydrocarbons having greater than about 2 carbon atoms, to methane, is greater than about 0.3.

4225. A mixture produced from a portion of a coal formation, the mixture comprising:

non-condensable hydrocarbons comprising hydrocarbons having carbon numbers of less than 5, wherein a weight ratio of hydrocarbons having carbon numbers from 2 through 4, to methane, is greater than approximately 1;

condensable hydrocarbons;

wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons comprises nitrogen;

wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons comprises oxygen; and

wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons comprises sulfur.

4226. The mixture of claim 4225, further comprising ammonia, wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

4227. The mixture of claim 4225, wherein less than about 5 weight % of the condensable hydrocarbons have a carbon number greater than approximately 25.

4228. The mixture of claim 4225, wherein the condensable hydrocarbons comprise olefins, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

4229. The mixture of claim 4225, wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

4230. The mixture of claim 4225, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

4231. The mixture of claim 4225, wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

4232. The mixture of claim 4225, wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

4233. The mixture of claim 4225, wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

4234. The mixture of claim 4225, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

4235. The mixture of claim 4225, wherein the non-condensable hydrocarbons comprises hydrogen, and wherein the hydrogen is greater than about 10 % by volume of the non-condensable hydrocarbons and wherein the hydrogen is less than about 80 % by volume of the non-condensable hydrocarbons.

4236. The mixture of claim 4225, further comprising ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

4237. The mixture of claim 4225, further comprising ammonia, and wherein the ammonia is used to produce fertilizer.

4238. The mixture of claim 4225, wherein the condensable hydrocarbons comprises oxygenated hydrocarbons, and wherein greater than about 5 % by weight of the condensable component comprises oxygenated hydrocarbons.

4239. The mixture of claim 4225, wherein the non-condensable hydrocarbons comprise H_2, and wherein greater than about 5 % by weight of the non-condensable hydrocarbons comprises H_2.

4240. The mixture of claim 4225, wherein the non-condensable hydrocarbons comprise H_2, and wherein greater than about 15 % by weight of the mixture comprises H_2.

4241. The mixture of claim 4225, wherein a weight ratio of hydrocarbons having greater than about 2 carbon atoms, to methane, is greater, than about 0.3.

4242. A mixture produced from a portion of a coal formation, the mixture comprising:

non-condensable hydrocarbons comprising hydrocarbons having carbon numbers of less than 5, wherein a weight ratio of hydrocarbons having carbon numbers from 2 through 4, to methane, is greater than approximately 1;

ammonia, wherein greater than about 0.5 % by weight of the mixture comprises ammonia; and

condensable hydrocarbons comprising oxygenated hydrocarbons, wherein greater than about 5 % by weight of the condensable hydrocarbons comprises oxygenated hydrocarbons.

4243. The mixture of claim 4242, wherein the condensable hydrocarbons further comprise olefins, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

4244. The mixture of claim 4242, wherein the non-condensable hydrocarbons further comprise ethene and ethane, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

4245. The mixture of claim 4242, wherein the condensable hydrocarbons further comprise nitrogen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

4246. The mixture of claim 4242, wherein the condensable hydrocarbons further comprise oxygen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

4247. The mixture of claim 4242, wherein the condensable hydrocarbons further comprise sulfur, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

4248. The mixture of claim 4242, wherein the condensable hydrocarbons further comprise oxygen containing compounds, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

4249. The mixture of claim 4242, wherein the condensable hydrocarbons further comprise aromatic compounds, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

4250. The mixture of claim 4242, wherein the condensable hydrocarbons further comprise multi-aromatic rings, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

4251. The mixture of claim 4242, wherein the condensable hydrocarbons further comprise asphaltenes, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

4252. The mixture of claim 4242, wherein the condensable hydrocarbons further comprise cycloalkanes, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

4253. The mixture of claim 4242, wherein the non-condensable hydrocarbons further comprise hydrogen, wherein the hydrogen is greater than about 10 % by volume of the

non-condensable hydrocarbons, and wherein the hydrogen is less than about 80 % by volume of the non-condensable hydrocarbons.

4254. The mixture of claim 4242, wherein the produced mixture further comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

4255. The mixture of claim 4242, wherein the produced mixture further comprises ammonia, and wherein the ammonia is used to produce fertilizer.

4256. The mixture of claim 4242, wherein the condensable hydrocarbons comprise hydrocarbons having a carbon number of greater than approximately 25, and wherein less than about 15 weight % of the hydrocarbons in the mixture have a carbon number greater than approximately 25.

4257. The mixture of claim 4242, wherein the non-condensable hydrocarbons further comprise H_2, and wherein greater than about 5 % by weight of the mixture comprises H_2.

4258. The mixture of claim 4242, wherein the non-condensable hydrocarbons further comprise H_2, and wherein greater than about 15 % by weight of the mixture comprises H_2.

4259. The mixture of claim 4242, wherein the non-condensable hydrocarbons further comprise hydrocarbons having carbon numbers of greater than 2, wherein a weight ratio of hydrocarbons having carbon numbers greater than 2, to methane, is greater than about 0.3.

4260. A mixture produced from a portion of a coal formation, the mixture comprising:

non-condensable hydrocarbons comprising hydrocarbons having carbon numbers of less than 5, wherein a weight ratio of hydrocarbons having carbon numbers from 2 through 4, to methane, is greater than approximately 1; and

condensable hydrocarbons comprising olefins, wherein less than about 10 % by weight of the condensable hydrocarbons comprises olefins.

4261. The mixture of claim 4260, wherein the non-condensable hydrocarbons further comprise ethene and ethane, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

4262. The mixture of claim 4260, wherein the condensable hydrocarbons further comprise nitrogen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

4263. The mixture of claim 4260, wherein the condensable hydrocarbons further comprise oxygen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

4264. The mixture of claim 4260, wherein the condensable hydrocarbons further comprise sulfur, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

4265. The mixture of claim 4260, wherein the condensable hydrocarbons further comprise oxygen containing compounds, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

4266. The mixture of claim 4260, wherein the condensable hydrocarbons further comprise aromatic compounds, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

4267. The mixture of claim 4260, wherein the condensable hydrocarbons further comprise multi-ring aromatics, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

4268. The mixture of claim 4260, wherein the condensable hydrocarbons further comprise asphaltenes, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

4269. The mixture of claim 4260, wherein the condensable hydrocarbons further comprise cycloalkanes, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

4270. The mixture of claim 4260, wherein the non-condensable hydrocarbons further comprise hydrogen, and wherein the hydrogen is greater than about 10 % by volume of the non-condensable hydrocarbons and wherein the hydrogen is less than about 80 % by volume of the non-condensable hydrocarbons.

4271. The mixture of claim 4260, wherein the produced mixture further comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

4272. The mixture of claim 4260, wherein the produced mixture further comprises ammonia, and wherein the ammonia is used to produce fertilizer.

4273. The mixture of claim 4260, wherein the condensable hydrocarbons further comprise hydrocarbons having a carbon number of greater than approximately 25, and wherein less than about 15 % by weight of the hydrocarbons have a carbon number greater than approximately 25.

4274. The mixture of claim 4260, wherein about 0.1 % to about 5 % by weight of the condensable component comprises olefins.

4275. The mixture of claim 4260, wherein about 0.1% to about 2 % by weight of the condensable component comprises olefins.

4276. The mixture of claim 4260, wherein the condensable hydrocarbons further comprise oxygenated hydrocarbons, and wherein greater than about 5 % by weight of the condensable hydrocarbons comprises oxygenated hydrocarbons.

4277. The mixture of claim 4260, wherein the condensable hydrocarbons further comprise oxygenated hydrocarbons, and wherein greater than about 25 % by weight of the condensable component comprises oxygenated hydrocarbons.

4278. The mixture of claim 4260, wherein the non-condensable hydrocarbons further comprise H_2, and wherein greater than about 5 % by weight of the non-condensable hydrocarbons comprises H_2.

4279. The mixture of claim 4260, wherein the non-condensable hydrocarbons further comprise H_2, and wherein greater than about 15 % by weight of the non-condensable hydrocarbons comprises H_2.

4280. The mixture of claim 4260, wherein a weight ratio of hydrocarbons having greater than about 2 carbon atoms, to methane, is greater than about 0.3.

4281. A mixture produced from a portion of a coal formation, comprising:

condensable hydrocarbons, wherein less than about 15 weight % of the condensable hydrocarbons have a carbon number greater than 25; and

wherein the condensable hydrocarbons comprise oxygenated hydrocarbons, and wherein greater than about 5 % by weight of the condensable hydrocarbons comprises oxygenated hydrocarbons.

4282. The mixture of claim 4281, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise hydrocarbons having carbon numbers of less than 5, and wherein a weight ratio of hydrocarbons having carbon numbers from 2 through 4, to methane, is greater than approximately 1.

4283. The mixture of claim 4281, wherein the condensable hydrocarbons further comprise olefins, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

4284. The mixture of claim 4281, further comprising non-condensable hydrocarbons, wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

4285. The mixture of claim 4281, wherein the condensable hydrocarbons further comprise nitrogen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

4286. The mixture of claim 4281, wherein the condensable hydrocarbons further comprise oxygen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

4287. The mixture of claim 4281, wherein the condensable hydrocarbons further comprise sulfur, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

4288. The mixture of claim 4281, wherein the condensable hydrocarbons further comprise oxygen containing compounds, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

4289. The mixture of claim 4281, wherein the condensable hydrocarbons further comprise aromatic compounds, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

4290. The mixture of claim 4281, wherein the condensable hydrocarbons further comprise multi-ring aromatics, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

4291. The mixture of claim 4281, wherein the condensable hydrocarbons further comprise asphaltenes, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

4292. The mixture of claim 4281, wherein the condensable hydrocarbons further comprise cycloalkanes, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

4293. The mixture of claim 4281, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise hydrogen, and wherein the hydrogen is greater than about 10 % by volume of the non-condensable hydrocarbons and wherein the hydrogen is less than about 80 % by volume of the non-condensable hydrocarbons.

4294. The mixture of claim 4281, further comprising ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

4295. The mixture of claim 4281, further comprising ammonia, and wherein the ammonia is used to produce fertilizer.

4296. The mixture of claim 4281, wherein the condensable hydrocarbons further comprises olefins, and wherein less than about 10 % by weight of the condensable hydrocarbons comprises olefins.

4297. The mixture of claim 4281, wherein the condensable hydrocarbons further comprises olefins, and wherein about 0.1 % to about 5 % by weight of the condensable hydrocarbons comprises olefins.

4298. The mixture of claim 4281, wherein the condensable hydrocarbons further comprises olefins, and wherein about 0.1 % to about 2 % by weight of the condensable hydrocarbons comprises olefins.

4299. The mixture of claim 4281, wherein the condensable hydrocarbons further comprises oxygenated hydrocarbons, and wherein greater than about 5 % by weight of the condensable hydrocarbons comprises the oxygenated hydrocarbon.

4300. The mixture of claim 4281, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise H_2, wherein greater than about 5 % by weight of the non-condensable hydrocarbons comprises H_2.

4301. The mixture of claim 4281, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise H_2, wherein greater than about 15 % by weight of the non-condensable hydrocarbons comprises H_2.

4302. The mixture of claim 4281, wherein a weight ratio of hydrocarbons having greater than about 2 carbon atoms, to methane, is greater than about 0.3.

4303. A mixture produced from a portion of a coal formation, comprising:

condensable hydrocarbons, wherein less than about 15 % by weight of the condensable hydrocarbons have a carbon number greater than about 25;

wherein less than about 1 % by weight of the condensable hydrocarbons, when calculated on an atomic basis, is nitrogen;

wherein less than about 1 % by weight of the condensable hydrocarbons, when calculated on an atomic basis, is oxygen; and

wherein less than about 1 % by weight of the condensable hydrocarbons, when calculated on an atomic basis, is sulfur.

4304. The mixture of claim 4303, further comprising non-condensable hydrocarbons, wherein the non-condensable component comprises hydrocarbons having carbon numbers of less than 5, and wherein a weight ratio of hydrocarbons having carbon numbers from 2 through 4, to methane, is greater than approximately 1.

4305. The mixture of claim 4303, wherein the condensable hydrocarbons further comprise olefins, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

4306. The mixture of claim 4303, further comprising non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

4307. The mixture of claim 4303, wherein the condensable hydrocarbons further comprise oxygen containing compounds, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

4308. The mixture of claim 4303, wherein the condensable hydrocarbons further comprise aromatic compounds, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

4309. The mixture of claim 4303, wherein the condensable hydrocarbons further comprise multi-ring aromatics, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

4310. The mixture of claim 4303, wherein the condensable hydrocarbons further comprise asphaltenes, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

4311. The mixture of claim 4303, wherein the condensable hydrocarbons further comprise cycloalkanes, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

4312. The mixture of claim 4303, further comprising non-condensable hydrocarbons, and wherein the non-condensable hydrocarbons comprise hydrogen, and wherein greater than about 10 % by volume and less than about 80 % by volume of the non-condensable component comprises hydrogen.

4313. The mixture of claim 4303, further comprising ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

4314. The mixture of claim 4303, further comprising ammonia, and wherein the ammonia is used to produce fertilizer.

4315. The mixture of claim 4303, wherein the condensable component further comprises olefins, and wherein about 0.1 % to about 5 % by weight of the condensable component comprises olefins.

4316. The mixture of claim 4303, wherein the condensable component further comprises olefins, and wherein about 0.1 % to about 2.5 % by weight of the condensable component comprises olefins.

4317. The mixture of claim 4303, wherein the condensable hydrocarbons further comprise oxygenated hydrocarbons, and wherein greater than about 5 % by weight of the condensable hydrocarbons comprises oxygenated hydrocarbons.

4318. The mixture of claim 4303, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise H_2, and wherein greater than about 5 % by weight of the non-condensable hydrocarbons comprises H_2.

4319. The mixture of claim 4303, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise H_2, and wherein greater than about 15 % by weight of the non-condensable hydrocarbons comprises H_2.

4320. The mixture of claim 4303, further comprising non-condensable hydrocarbons, wherein a weight ratio of compounds within the non-condensable hydrocarbons having greater than about 2 carbon atoms, to methane, is greater than about 0.3.

4321. A mixture produced from a portion of a coal formation, comprising:

condensable hydrocarbons, wherein less than about 15 % by weight of the condensable hydrocarbons have a carbon number greater than 20; and

wherein the condensable hydrocarbons comprise olefins, wherein an olefin content of the condensable component is less than about 10 % by weight of the condensable component.

4322. The mixture of claim 4321, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise hydrocarbons having carbon numbers of less than 5, and wherein a weight ratio of hydrocarbons having carbon numbers from 2 through 4, to methane, is greater than approximately 1.

4323. The mixture of claim 4321, wherein the condensable hydrocarbons further comprise olefins, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

4324. The mixture of claim 4321, further comprising non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

4325. The mixture of claim 4321, wherein the condensable hydrocarbons further comprise nitrogen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

4326. The mixture of claim 4321, wherein the condensable hydrocarbons further comprise oxygen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

4327. The mixture of claim 4321, wherein the condensable hydrocarbons further comprise sulfur, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

4328. The mixture of claim 4321, wherein the condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

4329. The mixture of claim 4321, wherein the condensable hydrocarbons further comprise aromatic compounds, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

4330. The mixture of claim 4321, wherein the condensable hydrocarbons further comprise multi-ring aromatics, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

4331. The mixture of claim 4321, wherein the condensable hydrocarbons further comprise asphaltenes, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

4332. The mixture of claim 4321, wherein the condensable hydrocarbons further comprise cycloalkanes, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

4333. The mixture of claim 4321, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprises hydrogen, and wherein the hydrogen is about 10 % by volume to about 80 % by volume of the non-condensable hydrocarbons.

4334. The mixture of claim 4321, further comprising ammonia, wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

4335. The mixture of claim 4321, further comprising ammonia, and wherein the ammonia is used to produce fertilizer.

4336. The mixture of claim 4321, wherein about 0.1 % to about 5 % by weight of the condensable component comprises olefins.

4337. The mixture of claim 4321, wherein about 0.1 % to about 2 % by weight of the condensable component comprises olefins.

4338. The mixture of claim 4321, wherein the condensable component further comprises oxygenated hydrocarbons, and wherein greater than about 1.5 % by weight of the condensable component comprises oxygenated hydrocarbons.

4339. The mixture of claim 4321, wherein the condensable component further comprises oxygenated hydrocarbons, and wherein greater than about 25 % by weight of the condensable component comprises oxygenated hydrocarbons.

4340. The mixture of claim 4321, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise H_2, and wherein greater than about 5 % by weight of the non-condensable hydrocarbons comprises H_2.

4341. The mixture of claim 4321, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise H_2, and wherein greater than about 15 % by weight of the non-condensable hydrocarbons comprises H_2.

4342. The mixture of claim 4321, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise hydrocarbons having carbon numbers of less than 5, and wherein a weight ratio of hydrocarbons having carbon numbers from 2 through 4, to methane, is greater than approximately 0.3.

4343. A mixture produced from a portion of a coal formation, comprising:

condensable hydrocarbons, wherein less than about 5 % by weight of the condensable hydrocarbons comprises hydrocarbons having a carbon number greater than about 25; and

wherein the condensable hydrocarbons further comprise aromatic compounds, wherein more than about 20 % by weight of the condensable hydrocarbons comprises aromatic compounds.

4344. The mixture of claim 4343, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise hydrocarbons having carbon numbers of less than 5, and wherein a weight ratio of hydrocarbons having carbon numbers from 2 through 4, to methane, is greater than approximately 1.

4345. The mixture of claim 4343, wherein the condensable hydrocarbons further comprise olefins, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

4346. The mixture of claim 4343, further comprising non-condensable hydrocarbons, wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

4347. The mixture of claim 4343, wherein the condensable hydrocarbons further comprise nitrogen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

4348. The mixture of claim 4343, wherein the condensable hydrocarbons further comprise oxygen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

4349. The mixture of claim 4343, wherein the condensable hydrocarbons further comprise sulfur, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

4350. The mixture of claim 4343, wherein the condensable hydrocarbons further comprise oxygen containing compounds, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

4351. The mixture of claim 4343, wherein the condensable hydrocarbons further comprise multi-ring aromatics, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

4352. The mixture of claim 4343, wherein the condensable hydrocarbons further comprise asphaltenes, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

4353. The mixture of claim 4343, wherein the condensable hydrocarbons comprise cycloalkanes, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

4354. The mixture of claim 4343, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise hydrogen, and wherein the

hydrogen is greater than about 10 % by volume and less than about 80 % by volume of the non-condensable hydrocarbons.

4355. The mixture of claim 4343, further comprising ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

4356. The mixture of claim 4343, further comprising ammonia, and wherein the ammonia is used to produce fertilizer.

4357. The mixture of claim 4343, wherein the condensable hydrocarbons further comprise olefins, and wherein about 0.1 % to about 5 % by weight of the condensable hydrocarbons comprises olefins.

4358. The mixture of claim 4343, wherein the condensable hydrocarbons further comprises olefins, and wherein about 0.1 % to about 2 % by weight of the condensable hydrocarbons comprises olefins.

4359. The mixture of claim 4343, wherein the condensable hydrocarbons further comprises multi-ring aromatic compounds, and wherein less than about 2 % by weight of the condensable hydrocarbons comprises multi-ring aromatic compounds.

4360. The mixture of claim 4343, wherein the condensable hydrocarbons comprises oxygenated hydrocarbons, and wherein greater than about 1.5 % by weight of the condensable hydrocarbons comprises oxygenated hydrocarbons.

4361. The mixture of claim 4343, wherein the condensable hydrocarbons comprises oxygenated hydrocarbons, and wherein greater than about 25 % by weight of the condensable component comprises oxygenated hydrocarbons.

4362. The mixture of claim 4343, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise H_2, and wherein greater than about 5 % by weight of the non-condensable hydrocarbons comprises H_2.

4363. The mixture of claim 4343, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise H_2, and wherein greater than about 15 % by weight of the non-condensable hydrocarbons comprises H_2.

4364. The mixture of claim 4343, further comprising non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprises hydrocarbons having carbon numbers of less than 5, and wherein a weight ratio of hydrocarbons having carbon numbers from 2 through 4, to methane, is greater than approximately 0.3.

4365. A mixture produced from a portion of a coal formation, comprising:

non-condensable hydrocarbons comprising hydrocarbons having carbon numbers of less than about 5, wherein a weight ratio of the hydrocarbons having carbon number from 2 through 4, to methane, in the mixture is greater than approximately 1;

wherein the non-condensable hydrocarbons further comprise H_2, wherein greater than about 15 % by weight of the non-condensable hydrocarbons comprises H_2; and

condensable hydrocarbons, comprising:

oxygenated hydrocarbons, wherein greater than about 1.5 % by weight of the condensable hydrocarbons comprises oxygenated hydrocarbons;

olefins, wherein less than about 10 % by weight of the condensable hydrocarbons comprises olefins; and

aromatic compounds, wherein greater than about 20 % by weight of the condensable hydrocarbons comprises aromatic compounds.

4366. The mixture of claim 4365, wherein the non-condensable hydrocarbons further comprise ethene and ethane, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

4367. The mixture of claim 4365, wherein the condensable hydrocarbons further comprise nitrogen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

4368. The mixture of claim 4365, wherein the condensable hydrocarbons further comprise oxygen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

4369. The mixture of claim 4365, wherein the condensable hydrocarbons further comprise sulfur, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

4370. The mixture of claim 4365, wherein the condensable hydrocarbons further comprise oxygen containing compounds, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

4371. The mixture of claim 4365, wherein the condensable hydrocarbons comprise multi-ring aromatics, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

4372. The mixture of claim 4365, wherein the condensable hydrocarbons comprise asphaltenes, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

4373. The mixture of claim 4365, wherein the condensable hydrocarbons comprise cycloalkanes, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

4374. The mixture of claim 4365, wherein the non-condensable hydrocarbons further comprises hydrogen, and wherein greater than about 10 % by volume and less than about 80 % by volume of the non-condensable hydrocarbons.

4375. The mixture of claim 4365, further comprising ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

4376. The mixture of claim 4365, further comprising ammonia, and wherein the ammonia is used to produce fertilizer.

4377. The mixture of claim 4365, wherein the condensable hydrocarbons further comprise hydrocarbons having a carbon number of greater than approximately 25, wherein less than about 15 % by weight of the hydrocarbons have a carbon number greater than approximately 25.

4378. The mixture of claim 4365, wherein about 0.1 % to about 5 % by weight of the condensable hydrocarbons comprises olefins.

4379. The mixture of claim 4365, wherein about 0.1 % to about 2 % by weight of the condensable hydrocarbons comprises olefins.

4380. The mixture of claim 4365, wherein greater than about 25 % by weight of the condensable hydrocarbons comprises oxygenated hydrocarbons.

4381. The mixture of claim 4365, wherein the mixture comprises hydrocarbons having greater than about 2 carbon atoms, and wherein the weight ratio of hydrocarbons having greater than about 2 carbon atoms to methane is greater than about 0.3.

4382. A mixture produced from a portion of a coal formation, comprising:

condensable hydrocarbons, wherein less than about 5 % by weight of the condensable hydrocarbons comprises hydrocarbons having a carbon number greater than about 25;

wherein the condensable hydrocarbons further comprise:

oxygenated hydrocarbons, wherein greater than about 5 % by weight of the condensable hydrocarbons comprises oxygenated hydrocarbons;

olefins, wherein less than about 10 % by weight of the condensable hydrocarbons comprises olefins; and

aromatic compounds, wherein greater than about 30 % by weight of the condensable hydrocarbons comprises aromatic compounds; and

non-condensable hydrocarbons comprising H_2, wherein greater than about 15 % by weight of the non-condensable hydrocarbons comprises H_2.

4383. The mixture of claim 4382, wherein the non-condensable hydrocarbons further comprises hydrocarbons having carbon numbers of less than 5, and wherein a weight ratio of hydrocarbons having carbon numbers from 2 through 4, to methane, is greater than approximately 1.

4384. The mixture of claim 4382, wherein the non-condensable hydrocarbons comprise ethene and ethane, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

4385. The mixture of claim 4382, wherein the condensable hydrocarbons further comprise nitrogen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

4386. The mixture of claim 4382, wherein the condensable hydrocarbons further comprise oxygen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

4387. The mixture of claim 4382, wherein the condensable hydrocarbons further comprise sulfur, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

4388. The mixture of claim 4382, wherein the condensable hydrocarbons further comprise oxygen containing compounds, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

4389. The mixture of claim 4382, wherein the condensable hydrocarbons further comprise multi-ring aromatics, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

4390. The mixture of claim 4382, wherein the condensable hydrocarbons further comprise asphaltenes, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

4391. The mixture of claim 4382, wherein the condensable hydrocarbons comprise cycloalkanes, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

4392. The mixture of claim 4382, wherein greater than about 10 % by volume and less than about 80 % by volume of the non-condensable hydrocarbons is hydrogen.

4393. The mixture of claim 4382, further comprising ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

4394. The mixture of claim 4382, further comprising ammonia, and wherein the ammonia is used to produce fertilizer.

4395. The mixture of claim 4382, wherein about 0.1 % to about 5 % by weight of the condensable hydrocarbons comprises olefins.

4396. The mixture of claim 4382, wherein about 0.1 % to about 2 % by weight of the condensable hydrocarbons comprises olefins.

4397. The mixture of claim 4382, wherein the condensable hydrocarbons comprises oxygenated hydrocarbons, and wherein greater than about 15 % by weight of the condensable hydrocarbons comprises oxygenated hydrocarbons.

4398. The mixture of claim 4382, wherein the mixture comprises hydrocarbons having greater than about 2 carbon atoms, and wherein the weight ratio of hydrocarbons having greater than about 2 carbon atoms to methane is greater than about 0.3.

4399. A condensable mixture produced from a portion of a coal formation, comprising:

olefins, wherein about 0.1 % by weight to about 15 % by weight of the condensable mixture comprises olefins;

oxygenated hydrocarbons, wherein less than about 15 % by weight of the condensable mixture comprises oxygenated hydrocarbons; and

asphaltenes, wherein less than about 0.1 % by weight of the condensable mixture comprises asphaltenes.

4400. The mixture of claim 4399, wherein the condensable mixture further comprises hydrocarbons having a carbon number of greater than approximately 25, and wherein less than about 15 weight % of the hydrocarbons in the mixture have a carbon number greater than approximately 25.

4401. The mixture of claim 4399, wherein about 0.1 % by weight to about 5 % by weight of the condensable mixture comprises olefins.

4402. The mixture of claim 4399, wherein the condensable mixture further comprises non-condensable hydrocarbons, wherein the non-condensable hydrocarbons comprise ethene and ethane, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

4403. The mixture of claim 4399, wherein the condensable mixture further comprises nitrogen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable mixture is nitrogen.

4404. The mixture of claim 4399, wherein the condensable mixture further comprises oxygen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable mixture is oxygen.

4405. The mixture of claim 4399, wherein the condensable mixture further comprises sulfur, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable mixture is sulfur.

4406. The mixture of claim 4399, wherein the condensable mixture further comprises oxygen containing compounds, wherein about 5 % by weight to about 30 % by weight of the condensable mixture comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

4407. The mixture of claim 4399, wherein the condensable mixture further comprises aromatic compounds, and wherein greater than about 20 % by weight of the condensable mixture are aromatic compounds.

4408. The mixture of claim 4399, wherein the condensable mixture further comprises multi-ring aromatics, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

4409. The mixture of claim 4399, wherein the condensable mixture further comprises cycloalkanes, and wherein about 5 % by weight to about 30 % by weight of the condensable mixture are cycloalkanes.

4410. The mixture of claim 4399, wherein the condensable mixture comprises non-condensable hydrocarbons, and wherein the non-condensable hydrocarbons comprise hydrogen, and wherein the hydrogen is greater than about 10 % by volume of the non-condensable hydrocarbons and wherein the hydrogen is less than about 80 % by volume of the non-condensable hydrocarbons.

4411. The mixture of claim 4399, further comprising ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

4412. The mixture of claim 4399, further comprising ammonia, and wherein the ammonia is used to produce fertilizer.

4413. The mixture of claim 4399, wherein about 0.1 % by weight to about 2 % by weight of the condensable mixture comprises olefins.

4414. A condensable mixture produced from a portion of a coal formation, comprising:

olefins, wherein about 0.1 % by weight to about 2 % by weight of the condensable mixture comprises olefins;

multi-ring aromatics, wherein less than about 2 % by weight of the condensable mixture comprises multi-ring aromatics with more than two rings; and

oxygenated hydrocarbons, wherein greater than about 25 % by weight of the condensable mixture comprises oxygenated hydrocarbons.

4415. The mixture of claim 4414, further comprising hydrocarbons having a carbon number of greater than approximately 25, wherein less than about 5 weight % of the hydrocarbons in the mixture have a carbon number greater than approximately 25.

4416. The mixture of claim 4414, wherein the condensable mixture further comprises nitrogen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

4417. The mixture of claim 4414, wherein the condensable mixture further comprises oxygen, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

4418. The mixture of claim 4414, wherein the condensable mixture further comprises sulfur, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

4419. The mixture of claim 4414, wherein the condensable mixture further comprises oxygen containing compounds, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

4420. The mixture of claim 4414, wherein the condensable mixture further comprises aromatic compounds, and wherein greater than about 20 % by weight of the condensable mixture are aromatic compounds.

4421. The mixture of claim 4414, wherein the condensable mixture further comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

4422. The mixture of claim 4414, wherein the condensable mixture further comprises cycloalkanes, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

4423. The mixture of claim 4414, further comprising ammonia, wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

4424. The mixture of claim 4414, further comprising ammonia, wherein the ammonia is used to produce fertilizer.

4425. A mixture produced from a portion of a coal formation, comprising:

non-condensable hydrocarbons and H_2, wherein greater than about 10 % by volume of the non-condensable hydrocarbons and H_2 comprises H_2;

ammonia and water, wherein greater than about 0.5 % by weight of the mixture comprises ammonia; and

condensable hydrocarbons.

4426. The mixture of claim 4425, wherein the non-condensable hydrocarbons further comprise hydrocarbons having carbon numbers of less than 5, and wherein a weight ratio of the hydrocarbons having carbon numbers from 2 through 4, to methane, in the mixture is greater than approximately 1.

4427. The mixture of claim 4425, wherein greater than about 0.1 % by weight of the condensable hydrocarbons, and wherein less than about 15% by weight of the condensable hydrocarbons are olefins.

4428. The mixture of claim 4425, wherein the non-condensable hydrocarbons further comprise ethene and ethane, wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons is greater than about 0.001, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons is less than about 0.15.

4429. The mixture of claim 4425, wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

4430. The mixture of claim 4425, wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

4431. The mixture of claim 4425, wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

4432. The mixture of claim 4425, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

4433. The mixture of claim 4425, wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

4434. The mixture of claim 4425, wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

4435. The mixture of claim 4425, wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

4436. The mixture of claim 4425, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

4437. The mixture of claim 4425, wherein the H_2 is less than about 80 % by volume of the non-condensable hydrocarbons and H_2.

4438. The mixture of claim 4425, wherein the condensable hydrocarbons further comprise sulfur containing compounds.

4439. The mixture of claim 4425, wherein the ammonia is used to produce fertilizer.

4440. The mixture of claim 4425, wherein less than about 5 % of the condensable hydrocarbons have carbon numbers greater than 25.

4441. The mixture of claim 4425, wherein the condensable hydrocarbons comprise olefins, and wherein about 0.001 % by weight of the condensable hydrocarbons comprise olefins, and wherein less than about 15 % by weight of the condensable hydrocarbons comprise olefins.

4442. The mixture of claim 4425, wherein the condensable hydrocarbons comprise olefins, and wherein about 0.001 % by weight of the condensable hydrocarbons comprise olefins, and wherein less than about 10 % by weight of the condensable hydrocarbons comprise olefins.

4443. The mixture of claim 4425, wherein the condensable hydrocarbons comprise oxygenated hydrocarbons, and wherein greater than about 1.5 % by weight of the condensable hydrocarbons comprises oxygenated hydrocarbons.

4444. The mixture of claim 4425, wherein the condensable hydrocarbons further comprise nitrogen containing compounds.

4445. A method of treating a coal formation in situ comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

4446. The method of claim 4445, wherein three or more of the heat sources are located in the formation in a plurality of the units, and wherein the plurality of units are repeated over an area of the formation to form a repetitive pattern of units.

4447. The method of claim 4445, wherein three or more of the heat sources are located in the formation in a plurality of the units, wherein the plurality of units are repeated over an area of the formation to form a repetitive pattern of units, and wherein a ratio of heat sources in the repetitive pattern of units to production wells in the repetitive pattern is less than approximately 5.

4448. The method of claim 4445, wherein three or more of the heat sources are located in the formation in a plurality of the units, wherein the plurality of units are repeated over an area of the formation to form a repetitive pattern of units, wherein three or more production wells are located within an area defined by the plurality of units, wherein the three or more production wells are located in the formation in a unit of production wells. and wherein the unit of production wells comprises a triangular pattern.

4449. The method of claim 4445, wherein three or more of the heat sources are located in the formation in a plurality of the units, wherein the plurality of units are repeated over an area of the formation to form a repetitive pattern of units, wherein three or more injection wells are located within an area defined by the plurality of units, wherein the three or more injection wells are located in the formation in a unit of injection wells, and wherein the unit of injection wells comprises a triangular pattern.

4450. The method of claim 4445, wherein three or more of the heat sources are located in the formation in a plurality of the units, wherein the plurality of units are repeated over an area of the formation to form a repetitive pattern of units, wherein three or more production wells and three or more injection wells are located within an area defined by the plurality of units, wherein the three or more production wells are located in the formation in a unit of production wells, wherein the unit of production wells comprises a first triangular pattern, wherein the three or more injection wells are located in the formation in a unit of injection wells, wherein the unit of injection wells comprises a second triangular pattern, and wherein the first triangular pattern is substantially different than the second triangular pattern.

4451. The method of claim 4445, wherein three or more of the heat sources are located in the formation in a plurality of the units, wherein the plurality of units are repeated over an area of the formation to form a repetitive pattern of units, wherein three or more monitoring wells are located within an area defined by the plurality of units, wherein the

three or more monitoring wells are located in the formation in a unit of monitoring wells, and wherein the unit of monitoring wells comprises a triangular pattern.

4452. The method of claim 4445, wherein a production well is located in an area defined by the unit of heat sources.

4453. The method of claim 4445, wherein three or more of the heat sources are located in the formation in a first unit and a second unit, wherein the first unit is adjacent to the second unit, and wherein the first unit is inverted with respect to the second unit.

4454. The method of claim 4445, wherein a distance between each of the heat sources in the unit of heat sources varies by less than about 20 %.

4455. The method of claim 4445, wherein a distance between each of the heat sources in the unit of heat sources is approximately equal.

4456. The method of claim 4445, wherein providing heat from three or more heat sources comprises substantially uniformly providing heat to at least the portion of the formation.

4457. The method of claim 4445, wherein the heated portion comprises a substantially uniform temperature distribution.

4458. The method of claim 4445, wherein the heated portion comprises a substantially uniform temperature distribution, and wherein a difference between a highest temperature in the heated portion and a lowest temperature in the heated portion comprises less than about 200 °C.

4459. The method of claim 4445, wherein a temperature at an outer lateral boundary of the triangular pattern and a temperature at a center of the triangular pattern are approximately equal.

4460. The method of claim 4445, wherein a temperature at an outer lateral boundary of the triangular pattern and a temperature at a center of the triangular pattern increase substantially linearly after an initial period of time, and wherein the initial period of time comprises less than approximately 3 months.

4461. The method of claim 4445, wherein a time required to increase an average temperature of the heated portion to a selected temperature with the triangular pattern of heat sources is substantially less than a time required to increase the average temperature of the heated portion to the selected temperature with a hexagonal pattern of heat sources, and wherein a space between each of the heat sources in the triangular pattern is approximately equal to a space between each of the heat sources in the hexagonal pattern.

4462. The method of claim 4445, wherein a time required to increase a temperature at a coldest point within the heated portion to a selected temperature with the triangular pattern of heat sources is substantially less than a time required to increase a temperature at the coldest point within the heated portion to the selected temperature with a hexagonal pattern of heat sources, and wherein a space between each of the heat sources in the triangular pattern is approximately equal to a space between each of the heat sources in the hexagonal pattern.

4463. The method of claim 4445, wherein a time required to increase a temperature at a coldest point within the heated portion to a selected temperature with the triangular pattern of heat sources is substantially less than a time required to increase a temperature at the coldest point within the heated portion to the selected temperature with a hexagonal pattern of heat sources, and wherein a number of heat sources per unit area in the triangular pattern is equal to the number of heat sources per unit are in the hexagonal pattern of heat sources.

4464. The method of claim 4445, wherein a time required to increase a temperature at a coldest point within the heated portion to a selected temperature with the triangular

pattern of heat sources is substantially equal to a time required to increase a temperature at the coldest point within the heated portion to the selected temperature with a hexagonal pattern of heat sources, and wherein a space between each of the heat sources in the triangular pattern is approximately 5 m greater than a space between each of the heat sources in the hexagonal pattern.

4465. The method of claim 4445, wherein providing heat from three or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the coal formation from three or more of the heat sources, wherein the formation has an average heat capacity (C_v), and wherein heat from three or more of the heat sources pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein Pwr is the heating energy/day, h is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10°C/day.

4466. The method of claim 4445, wherein three or more of the heat sources comprise electrical heaters.

4467. The method of claim 4445, wherein three or more of the heat sources comprise surface burners.

4468. The method of claim 4445, wherein three or more of the heat sources comprise flameless distributed combustors.

4469. The method of claim 4445, wherein three or more of the heat sources comprise natural distributed combustors.

4470. The method of claim 4445, further comprising:

allowing the heat to transfer from three or more of the heat sources to a selected section of the formation such that heat from three or more of the heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation; and

producing a mixture of fluids from the formation.

4471. The method of claim 4470, further comprising controlling a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

4472. The method of claim 4470, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1.0° C per day during pyrolysis.

4473. The method of claim 4470, wherein allowing the heat to transfer from three or more of the heat sources to the selected section comprises transferring heat substantially by conduction.

4474. The method of claim 4470, wherein providing heat from three or more of the heat sources to at least the portion of the formation comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/m °C.

4475. The method of claim 4470, wherein the produced mixture comprises an API gravity of at least 25°.

4476. The method of claim 4470, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1% by weight to about 15% by weight of the condensable hydrocarbons are olefins.

4477. The method of claim 4470, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

4478. The method of claim 4470, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

4479. The method of claim 4470, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

4480. The method of claim 4470, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

4481. The method of claim 4470, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

4482. The method of claim 4470, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

4483. The method of claim 4470, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

4484. The method of claim 4470, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.1% by weight of the condensable hydrocarbons are asphaltenes.

4485. The method of claim 4470, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

4486. The method of claim 4470, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

4487. The method of claim 4470, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

4488. The method of claim 4470, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

4489. The method of claim 4470, further comprising controlling formation conditions to produce a mixture of hydrocarbon fluids and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 2.0 bar absolute.

4490. The method of claim 4470, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

4491. The method of claim 4470, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

4492. The method of claim 4470, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

4493. The method of claim 4470, further comprising:

producing hydrogen from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

4494. The method of claim 4470, wherein allowing the heat to transfer from three or more of the heat sources to the selected section of the formation comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

4495. The method of claim 4470, wherein allowing the heat to transfer from three or more of the heat sources to the selected section of the formation comprises substantially uniformly increasing a permeability of a majority of the selected section.

4496. The method of claim 4470, further comprising controlling the heat from three of more heat sources to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

4497. The method of claim 4470, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

4498. The method of claim 4470, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

4499. The method of claim 4470, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

4500. A method for in situ production of synthesis gas from a coal formation, comprising:

heating a section of the formation to a temperature sufficient to allow synthesis gas generation, wherein a permeability of the section is substantially uniform and greater than a permeability of an unheated section of the formation when the temperature sufficient to allow synthesis gas generation within the formation is achieved;

providing a synthesis gas generating fluid to the section to generate synthesis gas; and

removing synthesis gas from the formation.

4501. The method of claim 4500, wherein the permeability of the section is greater than about 100 millidarcy when the temperature sufficient to allow synthesis gas generation within the formation is achieved.

4502. The method of claim 4500, wherein the temperature sufficient to allow synthesis gas generation ranges from approximately 400 °C to approximately 1200 °C.

4503. The method of claim 4500, further comprising heating the section when providing the synthesis gas generating fluid to inhibit temperature decrease in the section due to synthesis gas generation.

4504. The method of claim 4500, wherein heating the section comprises convecting an oxidizing fluid into a portion of the section, wherein the temperature within the section is above a temperature sufficient to support oxidation of carbon within the section with the

oxidizing fluid, and reacting the oxidizing fluid with carbon in the section to generate heat within the section.

4505. The method of claim 4504, wherein the oxidizing fluid comprises air.

4506. The method of claim 4505, wherein an amount of the oxidizing fluid convected into the section is configured to inhibit formation of oxides of nitrogen by maintaining a reaction temperature below a temperature sufficient to produce oxides of nitrogen compounds.

4507. The method of claim 4500, wherein heating the section comprises diffusing an oxidizing fluid to reaction zones adjacent to wellbores within the formation, oxidizing carbon within the reaction zone to generate heat, and transferring the heat to the section.

4508. The method of claim 4500, wherein heating the section comprises heating the section by transfer of heat from one or more of electrical heaters.

4509. The method of claim 4500, wherein heating the section to a temperature sufficient to allow synthesis gas generation and providing a synthesis gas generating fluid to the section comprises introducing steam into the section to heat the formation and to generate synthesis gas.

4510. The method of claim 4500, further comprising controlling the heating of the section and provision of the synthesis gas generating fluid to maintain a temperature within the section above the temperature sufficient to generate synthesis gas.

4511. The method of claim 4500, further comprising:

monitoring a composition of the produced synthesis gas; and

controlling heating of the section and provision of the synthesis gas generating fluid to maintain the composition of the produced synthesis gas within a selected range.

4512. The method of claim 4511, wherein the selected range comprises a ratio of H_2 to CO of about 2:1.

4513. The method of claim 4500, wherein the synthesis gas generating fluid comprises liquid water.

4514. The method of claim 4500, wherein the synthesis gas generating fluid comprises steam.

4515. The method of claim 4500, wherein the synthesis gas generating fluid comprises water and carbon dioxide, and wherein the carbon dioxide inhibits production of carbon dioxide from carbon containing material within the section.

4516. The method of claim 4515, wherein a portion of the carbon dioxide within the synthesis gas generating fluid comprises carbon dioxide removed from the formation.

4517. The method of claim 4500, wherein the synthesis gas generating fluid comprises carbon dioxide, and wherein a portion of the carbon dioxide reacts with carbon in the formation to generate carbon monoxide.

4518. The method of claim 4517, wherein a portion of the carbon dioxide within the synthesis gas generating fluid comprises carbon dioxide removed from the formation.

4519. The method of claim 4500, wherein providing the synthesis gas generating fluid to the section comprises raising a water table of the formation to allow water to flow into the section.

4520. The method of claim 4500, wherein the synthesis gas is removed from a producer well equipped with a heating source, and wherein a portion of the heating source adjacent to a synthesis gas producing zone operates at a substantially constant temperature to

promote production of the synthesis gas wherein the synthesis gas has a selected composition.

4521. The method of claim 4520, wherein the substantially constant temperature is about 700 °C, and wherein the selected composition has a H_2 to CO ratio of about 2:1.

4522. The method of claim 4500, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers less than 5, and wherein at least a portion of the hydrocarbons are subjected to a reaction within the section to increase a H_2 concentration of the generated synthesis gas.

4523. The method of claim 4500, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers greater than 4, and wherein at least a portion of the hydrocarbons react within the section to increase an energy content of the synthesis gas removed from the formation.

4524. The method of claim 4500, further comprising maintaining a pressure within the formation during synthesis gas generation, and passing produced synthesis gas through a turbine to generate electricity.

4525. The method of claim 4500, further comprising generating electricity from the synthesis gas using a fuel cell.

4526. The method of claim 4500, further comprising generating electricity from the synthesis gas using a fuel cell, separating carbon dioxide from a fluid exiting the fuel cell, and storing a portion of the separated carbon dioxide within a spent section of the formation.

4527. The method of claim 4500, further comprising using a portion of the synthesis gas as a combustion fuel to heat the formation.

4528. The method of claim 4500, further comprising converting at least a portion of the produced synthesis gas to condensable hydrocarbons using a Fischer-Tropsch synthesis process.

4529. The method of claim 4500, further comprising converting at least a portion of the produced synthesis gas to methanol.

4530. The method of claim 4500, further comprising converting at least a portion of the produced synthesis gas to gasoline.

4531. The method of claim 4500, further comprising converting at least a portion of the synthesis gas to methane using a catalytic methanation process.

4532. The method of claim 4500, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

4533. The method of claim 4500, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

4534. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to substantially uniformly increase a permeability of the portion and to increase a temperature of the portion to a temperature sufficient to allow synthesis gas generation;

providing a synthesis gas generating fluid to at least the portion of the selected section, wherein the synthesis gas generating fluid comprises carbon dioxide;

obtaining a portion of the carbon dioxide of the synthesis gas generating fluid from the formation; and

producing synthesis gas from the formation.

4535. The method of claim 4534, wherein the temperature sufficient to allow synthesis gas generation is within a range from about 400 °C to about 1200 °C.

4536. The method of claim 4534, further comprising using a second portion of the separated carbon dioxide as a flooding agent to produce hydrocarbon bed methane from a coal formation.

4537. The method of claim 4536, wherein the coal formation is a deep coal formation over 760 m below ground surface.

4538. The method of claim 4536, wherein the coal formation adsorbs some of the carbon dioxide to sequester the carbon dioxide.

4539. The method of claim 4534, further comprising using a second portion of the separated carbon dioxide as a flooding agent for enhanced oil recovery.

4540. The method of claim 4534, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers less than 5, and wherein at least a portion of the hydrocarbons undergo a reaction within the selected section to increase a H_2 concentration within the produced synthesis gas.

4541. The method of claim 4534, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers greater than 4, and wherein at least a portion of the hydrocarbons react within the selected section to increase an energy content of the produced synthesis gas.

4542. The method of claim 4534, further comprising maintaining a pressure within the formation during synthesis gas generation, and passing produced synthesis gas through a turbine to generate electricity.

4543. The method of claim 4534, further comprising generating electricity from the synthesis gas using a fuel cell.

4544. The method of claim 4534, further comprising generating electricity from the synthesis gas using a fuel cell, separating carbon dioxide from a fluid exiting the fuel cell, and storing a portion of the separated carbon dioxide within a spent portion of the formation.

4545. The method of claim 4534, further comprising using a portion of the synthesis gas as a combustion fuel for heating the formation.

4546. The method of claim 4534, further comprising converting at least a portion of the produced synthesis gas to condensable hydrocarbons using a Fischer-Tropsch synthesis process.

4547. The method of claim 4534, further comprising converting at least a portion of the produced synthesis gas to methanol.

4548. The method of claim 4534, further comprising converting at least a portion of the produced synthesis gas to gasoline.

4549. The method of claim 4534, further comprising converting at least a portion of the synthesis gas to methane using a catalytic methanation process.

4550. The method of claim 4534, wherein a temperature of the one or more heat sources wellbore is maintained at a temperature of less than approximately 700 °C to produce a synthesis gas having a ratio of H_2 to carbon monoxide of greater than about 2.

4551. The method of claim 4534, wherein a temperature of the one or more heat sources wellbore is maintained at a temperature of greater than approximately 700 °C to produce a synthesis gas having a ratio of H_2 to carbon monoxide of less than about 2.

4552. The method of claim 4534, wherein a temperature of the one or more heat sources wellbore is maintained at a temperature of approximately 700 °C to produce a synthesis gas having a ratio of H_2 to carbon monoxide of approximately 2.

4553. The method of claim 4534, wherein a heat source of the one or more of heat sources comprises an electrical heater.

4554. The method of claim 4534, wherein a heat source of the one or more heat sources comprises a natural distributor heater.

4555. The method of claim 4534, wherein a heat source of the one or more heat sources comprises a flameless distributor combustor (FDC) heater, and wherein fluids are produced from the wellbore of the FDC heater through a conduit positioned within the wellbore.

4556. The method of claim 4534, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

4557. The method of claim 4534, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat

sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

4558. A method of in situ synthesis gas production, comprising:

providing heat from one or more flameless distributed combustor heaters to at least a first portion of a coal formation;

allowing the heat to transfer from the one or more heaters to a selected section of the formation such that the heat from the one or more heaters substantially uniformly increases a permeability of the selected section, and to raise a temperature of the selected section to a temperature sufficient to generate synthesis gas;

introducing a synthesis gas producing fluid into the selected section to generate synthesis gas; and

removing synthesis gas from the formation.

4559. The method of claim 4558, wherein the one or more heaters comprise at least two heaters, and wherein superposition of heat from at least the two heaters substantially uniformly increases a permeability of the selected section, and raises a temperature of the selected section to a temperature sufficient to generate synthesis gas.

4560. The method of claim 4558, further comprising producing the synthesis gas from the formation under pressure, and generating electricity from the produced synthesis gas by passing the produced synthesis gas through a turbine.

4561. The method of claim 4558, further comprising producing pyrolyzation products from the formation when raising the temperature of the selected section to the temperature sufficient to generate synthesis gas.

4562. The method of claim 4558, further comprising separating a portion of carbon dioxide from the removed synthesis gas, and storing the carbon dioxide within a spent portion of the formation.

4563. The method of claim 4558, further comprising storing carbon dioxide within a spent portion of the formation, wherein an amount of carbon dioxide stored within the spent portion of the formation is equal to or greater than an amount of carbon dioxide within the removed synthesis gas.

4564. The method of claim 4558, further comprising separating a portion of H_2 from the removed synthesis gas; and using a portion of the separated H_2 as fuel for the one or more heaters.

4565. The method of claim 4564, further comprising using a portion of exhaust products from one or more heaters as a portion of the synthesis gas producing fluid

4566. The method of claim 4558, further comprising using a portion of the removed synthesis gas with a fuel cell to generate electricity.

4567. The method of claim 4566, wherein the fuel cell produces steam, and wherein a portion of the steam is used as a portion of the synthesis gas producing fluid.

4568. The method of claim 4566, wherein the fuel cell produces carbon dioxide, and wherein a portion of the carbon dioxide is introduced into the formation to react with carbon within the formation to produce carbon monoxide.

4569. The method of claim 4566, wherein the fuel cell produces carbon dioxide, and storing an amount of carbon dioxide within a spent portion of the formation equal or greater to an amount of the carbon dioxide produced by the fuel cell.

4570. The method of claim 4558, further comprising using a portion of the removed synthesis gas as a feed product for formation of hydrocarbons.

4571. The method of claim 4558, wherein the synthesis gas producing fluid comprises hydrocarbons having carbon numbers less than 5, and wherein the hydrocarbons crack within the formation to increase an amount of H_2 within the generated synthesis gas.

4572. The method of claim 4558, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

4573. The method of claim 4558, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

4574. A method of treating a coal formation, comprising:

heating a portion of the formation with one or more electrical heaters to a temperature sufficient to pyrolyze hydrocarbons within the portion;

producing pyrolyzation fluid from the formation;

separating a fuel cell feed stream from the pyrolyzation fluid; and

directing the fuel cell feed stream to a fuel cell to produce electricity;

4575. The method of claim 4574, wherein the fuel cell is a molten carbonate fuel cell.

4576. The method of claim 4574, wherein the fuel cell is a solid oxide fuel cell.

4577. The method of claim 4574, further comprising using a portion of the produced electricity to power the electrical heaters.

4578. The method of claim 4574, wherein heating the portion of the formation is performed at a rate sufficient to increase a permeability of the portion and to produce a substantially uniform permeability within the portion.

4579. The method of claim 4574, wherein the fuel cell feed stream comprises H_2 and hydrocarbons having a carbon number of less than 5.

4580. The method of claim 4574, wherein the fuel cell feed stream comprises H_2 and hydrocarbons having a carbon number of less than 3.

4581. The method of claim 4574, further comprising hydrogenating the pyrolyzation fluid with a portion of H_2 from the pyrolyzation fluid.

4582. The method of claim 4574, wherein the hydrogenation is done in situ by directing the H_2 into the formation.

4583. The method of claim 4574, wherein the hydrogenation is done in a surface unit.

4584. The method of claim 4574, further comprising directing hydrocarbon fluid having carbon numbers less than 5 adjacent to at least one of the electrical heaters, cracking a portion of the hydrocarbons to produce H_2, and producing a portion of the hydrogen from the formation.

4585. The method of claim 4584, further comprising directing an oxidizing fluid adjacent to at least the one of the electrical heaters, oxidizing coke deposited on or near the at least one of the electrical heaters with the oxidizing fluid.

4586. The method of claim 4574, further comprising storing CO_2 from the fuel cell within the formation.

4587. The method of claim 4586, wherein the CO_2 is adsorbed to carbon material within a spent portion of the formation.

4588. The method of claim 4574, further comprising cooling the portion to form a spent portion of formation.

4589. The method of claim 4588, wherein cooling the portion comprises introducing water into the portion to produce steam, and removing steam from the formation.

4590. The method of claim 4589, further comprising using a portion of the removed steam to heat a second portion of the formation.

4591. The method of claim 4589, further comprising using a portion of the removed steam as a synthesis gas producing fluid in a second portion of the formation.

4592. The method of claim 4574, further comprising:

heating the portion to a temperature sufficient to support generation of synthesis gas after production of the pyrolyzation fluids;

introducing a synthesis gas producing fluid into the portion to generate synthesis gas; and

removing a portion of the synthesis gas from the formation.

4593. The method of claim 4592, further comprising producing the synthesis gas from the formation under pressure, and generating electricity from the produced synthesis gas by passing the produced synthesis gas through a turbine.

4594. The method of claim 4592, further comprising using a first portion of the removed synthesis gas as fuel cell feed.

4595. The method of claim 4592, further comprising producing steam from operation of the fuel cell, and using the steam as part of the synthesis gas producing fluid.

4596. The method of claim 4592, further comprising using carbon dioxide from the fuel cell as a part of the synthesis gas producing fluid.

4597. The method of claim 4592, further comprising using a portion of the synthesis gas to produce hydrocarbon product.

4598. The method of claim 4592, further comprising cooling the portion to form a spent portion of formation.

4599. The method of claim 4598, wherein cooling the portion comprises introducing water into the portion to produce steam, and removing steam from the formation.

4600. The method of claim 4599, further comprising using a portion of the removed steam to heat a second portion of the formation.

4601. The method of claim 4599, further comprising using a portion of the removed steam as a synthesis gas producing fluid in a second portion of the formation.

4602. The method of claim 4574, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

4603. The method of claim 4574, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

4604. A method for in situ production of synthesis gas from a coal formation, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation such that the heat from the one or more heat sources pyrolyzes at least some of the hydrocarbons within the selected section of the formation;

producing pyrolysis products from the formation;

heating at least a portion of the selected section to a temperature sufficient to generate synthesis gas;

providing a synthesis gas generating fluid to at least the portion of the selected section to generate synthesis gas; and

producing a portion of the synthesis gas from the formation.

4605. The method of claim 4604, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

4606. The method of claim 4604, further comprising allowing the heat to transfer from the one or more heat sources to the selected section to substantially uniformly increase a permeability of the selected section.

4607. The method of claim 4604, further comprising controlling heat transfer from the one or more heat sources to produce a permeability within the selected section of greater than about 100 millidarcy.

4608. The method of claim 4604, further comprising heating at least the portion of the selected section when providing the synthesis gas generating fluid to inhibit temperature decrease within the selected section during synthesis gas generation.

4609. The method of claim 4604, wherein the temperature sufficient to allow synthesis gas generation is within a range from approximately 400 °C to approximately 1200 °C.

4610. The method of claim 4604, wherein heating at least the portion of the selected section to a temperature sufficient to allow synthesis gas generation comprises:

heating zones adjacent to wellbores of one or more heat sources with heaters disposed in the wellbores, wherein the heaters are configured to raise temperatures of the zones to temperatures sufficient to support reaction of hydrocarbon material within the zones with an oxidizing fluid;

introducing the oxidizing fluid to the zones substantially by diffusion;

allowing the oxidizing fluid to react with at least a portion of the hydrocarbon material within the zones to produce heat in the zones; and

transferring heat from the zones to the selected section.

4611. The method of claim 4604, wherein heating at least the portion of the selected section to a temperature sufficient to allow synthesis gas generation comprises:

introducing an oxidizing fluid into the formation through a wellbore;

transporting the oxidizing fluid substantially be convection into the portion of the selected section, wherein the portion of the selected section is at a temperature sufficient to support an oxidization reaction with the oxidizing fluid; and

reacting the oxidizing fluid within the portion of the selected section to generate heat and raise the temperature of the portion.

4612. The method of claim 4604, wherein the one or more heat sources comprise one or more electrical heaters disposed in the formation.

4613. The method of claim 4604, wherein one or more heat sources comprise one or more heater wells, wherein at least one heater well comprises a conduit disposed within the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

4614. The method of claim 4604, wherein heating at least the portion of the selected section to a temperature sufficient to allow synthesis gas generation and providing a synthesis gas generating fluid to at least the portion of the selected section comprises introducing steam into the portion.

4615. The method of claim 4604, further comprising controlling the heating of at least the portion of selected section and provision of the synthesis gas generating fluid to maintain a temperature within at least the portion of the selected section above the temperature sufficient to generate synthesis gas.

4616. The method of claim 4604, further comprising:

monitoring a composition of the produced synthesis gas; and

controlling heating of at least the portion of selected section and provision of the synthesis gas generating fluid to maintain the composition of the produced synthesis gas within a desired range.

4617. The method of claim 4604, wherein the synthesis gas generating fluid comprises liquid water.

4618. The method of claim 4604, wherein the synthesis gas generating fluid comprises steam.

4619. The method of claim 4604, wherein the synthesis gas generating fluid comprises water and carbon dioxide, wherein the carbon dioxide inhibits production of carbon dioxide from the selected section.

4620. The method of claim 4619, wherein a portion of the carbon dioxide within the synthesis gas generating fluid comprises carbon dioxide removed from the formation.

4621. The method of claim 4604, wherein the synthesis gas generating fluid comprises carbon dioxide, and wherein a portion of the carbon dioxide reacts with carbon in the formation to generate carbon monoxide.

4622. The method of claim 4621, wherein a portion of the carbon dioxide within the synthesis gas generating fluid comprises carbon dioxide removed from the formation.

4623. The method of claim 4604, wherein providing the synthesis gas generating fluid to at least the portion of the selected section comprises raising a water table of the formation to allow water to flow into the at least the portion of the selected section.

4624. The method of claim 4604, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers less than 5, and wherein at least a portion of the hydrocarbons are subjected to a reaction within at least the portion of the selected section to increase a H_2 concentration within the produced synthesis gas.

4625. The method of claim 4604, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers greater than 4, and wherein at least a portion of the hydrocarbons react within at least the portion of the selected section to increase an energy content of the produced synthesis gas.

4626. The method of claim 4604, further comprising maintaining a pressure within the formation during synthesis gas generation, and passing produced synthesis gas through a turbine to generate electricity.

4627. The method of claim 4604, further comprising generating electricity from the synthesis gas using a fuel cell.

4628. The method of claim 4604, further comprising generating electricity from the synthesis gas using a fuel cell, separating carbon dioxide from a fluid exiting the fuel cell,

and storing a portion of the separated carbon dioxide within a spent section of the formation.

4629. The method of claim 4604, further comprising using a portion of the synthesis gas as a combustion fuel for the one or more heat sources.

4630. The method of claim 4604, further comprising converting at least a portion of the produced synthesis gas to condensable hydrocarbons using a Fischer-Tropsch synthesis process.

4631. The method of claim 4604, further comprising converting at least a portion of the produced synthesis gas to methanol.

4632. The method of claim 4604, further comprising converting at least a portion of the produced synthesis gas to gasoline.

4633. The method of claim 4604, further comprising converting at least a portion of the synthesis gas to methane using a catalytic methanation process.

4634. The method of claim 4604, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

4635. The method of claim 4604, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

4636. A method for in situ production of synthesis gas from a coal formation, comprising:

heating a first portion of the formation to pyrolyze some hydrocarbons within the first portion;

allowing the heat to transfer from one or more heat sources to a selected section of the formation,

pyrolyzing hydrocarbons within the selected section;

producing fluid from the first portion, wherein the fluid comprises an aqueous fluid and a hydrocarbon fluid;

heating a second portion of the formation to a temperature sufficient to allow synthesis gas generation;

introducing at least a portion of the aqueous fluid to the second section after the section reaches the temperature sufficient to allow synthesis gas generation; and

producing synthesis gas from the formation.

4637. The method of claim 4636, wherein the temperature sufficient to allow synthesis gas generation ranges from approximately 400 °C to approximately 1200 °C.

4638. The method of claim 4636, further comprising separating ammonia within the aqueous phase from the aqueous phase prior to introduction of at least the portion of the aqueous fluid to the second section.

4639. The method of claim 4636, wherein a permeability of the second portion of the formation is substantially uniform and greater than about 100 millidarcy when the temperature sufficient to allow synthesis gas generation is achieved.

4640. The method of claim 4636, further comprising heating the second portion of the formation during introduction of at least the portion of the aqueous fluid to the second section to inhibit temperature decrease in the second section due to synthesis gas generation.

4641. The method of claim 4636, wherein heating the second portion of the formation comprises convecting an oxidizing fluid into a portion of the second portion that is above a temperature sufficient to support oxidation of carbon within the portion with the oxidizing fluid, and reacting the oxidizing fluid with carbon in the portion to generate heat within the portion.

4642. The method of claim 4636, wherein heating the second portion of the formation comprises diffusing an oxidizing fluid to reaction zones adjacent to wellbores within the formation, oxidizing carbon within the reaction zones to generate heat, and transferring the heat to the second portion.

4643. The method of claim 4636, wherein heating the second portion of the formation comprises heating the second section by transfer of heat from one or more electrical heaters.

4644. The method of claim 4636, wherein heating the second portion of the formation comprises heating the second section with a flameless distributor combustor.

4645. The method of claim 4636, wherein heating the second portion of the formation comprises injecting steam into at least the portion of the formation.

4646. The method of claim 4636, wherein at least a portion of the aqueous fluid comprises a liquid phase.

4647. The method of claim 4636, wherein the aqueous fluid comprises a vapor phase.

4648. The method of claim 4636, further comprising adding carbon dioxide to at least the portion of aqueous fluid to inhibit production of carbon dioxide from carbon within the formation.

4649. The method of claim 4648, wherein a portion of the carbon dioxide comprises carbon dioxide removed from the formation.

4650. The method of claim 4636, further comprising adding hydrocarbons with carbon numbers less than 5 to at least the portion of the aqueous fluid to increase a H_2 concentration within the produced synthesis gas.

4651. The method of claim 4636, further comprising adding hydrocarbons with carbon numbers less than 5 to at least the portion of the aqueous fluid to increase a H_2 concentration within the produced synthesis gas, wherein the hydrocarbons are obtained from the produced fluid.

4652. The method of claim 4636, further comprising adding hydrocarbons greater than 4 to at least the portion of the aqueous fluid to increase energy content of the produced synthesis gas.

4653. The method of claim 4636, further comprising adding hydrocarbons greater than 4 to at least the portion of the aqueous fluid to increase energy content of the produced synthesis gas, wherein the hydrocarbons are obtained from the produced fluid.

4654. The method of claim 4636, further comprising maintaining a pressure within the formation during synthesis gas generation, and passing produced synthesis gas through a turbine to generate electricity.

4655. The method of claim 4636, further comprising generating electricity from the synthesis gas using a fuel cell.

4656. The method of claim 4636, further comprising generating electricity from the synthesis gas using a fuel cell, separating carbon dioxide from a fluid exiting the fuel cell, and storing a portion of the separated carbon dioxide within a spent portion of the formation.

4657. The method of claim 4636, further comprising using a portion of the synthesis gas as a combustion fuel for the one or more heat sources.

4658. The method of claim 4636, further comprising converting at least a portion of the produced synthesis gas to condensable hydrocarbons using a Fischer-Tropsch synthesis process.

4659. The method of claim 4636, further comprising converting at least a portion of the produced synthesis gas to methanol.

4660. The method of claim 4636, further comprising converting at least a portion of the produced synthesis gas to gasoline.

4661. The method of claim 4636, further comprising converting at least a portion of the synthesis gas to methane using a catalytic methanation process.

4662. The method of claim 4636, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

4663. The method of claim 4636, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

4664. A method for in situ production of synthesis gas from a coal formation, comprising:

heating a portion of the formation with one or more heat sources to create increased and substantially uniform permeability within a portion of the formation and to raise a temperature within the portion to a temperature sufficient to allow synthesis gas generation;

providing a synthesis gas generating fluid into the portion through at least one injection wellbore to generate synthesis gas from hydrocarbons and the synthesis gas generating fluid; and

producing synthesis gas from at least one heat source wellbore in which is positioned proximate to a heat source of the one or more heat sources.

4665. The method of claim 4664, wherein the temperature sufficient to allow synthesis gas generation is within a range from about 400° C to about 1200 °C.

4666. The method of claim 4664, wherein creating a substantially uniform permeability comprises heating the portion to a temperature within a range sufficient to pyrolyze hydrocarbons within the portion, raising the temperature within the portion at a rate of less than about 5 °C per day during pyrolyzation and removing a portion of pyrolyzed fluid from the formation.

4667. The method of claim 4664, further comprising removing fluid from the formation through at least the one injection wellbore prior to heating the selected section to the temperature sufficient to allow synthesis gas generation.

4668. The method of claim 4664, wherein the injection wellbore comprises a wellbore of a heat source in which is positioned a heat source of the one or more heat sources.

4669. The method of claim 4664, further comprising heating the selected portion during providing the synthesis gas generating fluid to inhibit temperature decrease in at least the portion of the selected section due to synthesis gas generation.

4670. The method of claim 4664, further comprising providing a portion of the heat needed to raise the temperature sufficient to allow synthesis gas generation by convecting an oxidizing fluid to hydrocarbons within the selected section to oxidize a portion of the hydrocarbons and generate heat.

4671. The method of claim 4664, further comprising controlling the heating of the selected section and provision of the synthesis gas generating fluid to maintain a temperature within the selected section above the temperature sufficient to generate synthesis gas.

4672. The method of claim 4664, further comprising:

monitoring a composition of the produced synthesis gas; and

controlling heating of the selected section and provision of the synthesis gas generating fluid to maintain the composition of the produced synthesis gas within a desired range.

4673. The method of claim 4664, wherein the synthesis gas generating fluid comprises liquid water.

4674. The method of claim 4664, wherein the synthesis gas generating fluid comprises steam.

4675. The method of claim 4664, wherein the synthesis gas generating fluid comprises steam to heat the selected section and to generate synthesis gas.

4676. The method of claim 4664, wherein the synthesis gas generating fluid comprises water and carbon dioxide.

4677. The method of claim 4676, wherein a portion of the carbon dioxide comprises carbon dioxide removed from the formation.

4678. The method of claim 4664, wherein the synthesis gas generating fluid comprises carbon dioxide, and wherein a portion of the carbon dioxide reacts with carbon in the formation to generate carbon monoxide.

4679. The method of claim 4678, wherein a portion of the carbon dioxide comprises carbon dioxide removed from the formation.

4680. The method of claim 4664, wherein providing the synthesis gas generating fluid to the selected section comprises raising a water table of the formation to allow water to enter the selected section.

4681. The method of claim 4664, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers less than 5, and wherein at least a portion of the hydrocarbons undergo a reaction within the selected section to increase a H_2 concentration within the produced synthesis gas.

4682. The method of claim 4664, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers greater than 4, and wherein at least a portion of the hydrocarbons react within the selected section to increase an energy content of the produced synthesis gas.

4683. The method of claim 4664, further comprising maintaining a pressure within the formation during synthesis gas generation, and passing produced synthesis gas through a turbine to generate electricity.

4684. The method of claim 4664, further comprising generating electricity from the synthesis gas using a fuel cell.

4685. The method of claim 4664, further comprising generating electricity from the synthesis gas using a fuel cell, separating carbon dioxide from a fluid exiting the fuel cell,

and storing a portion of the separated carbon dioxide within a spent portion of the formation.

4686. The method of claim 4664, further comprising using a portion of the synthesis gas as a combustion fuel for heating the formation.

4687. The method of claim 4664, further comprising converting at least a portion of the produced synthesis gas to condensable hydrocarbons using a Fischer-Tropsch synthesis process.

4688. The method of claim 4664, further comprising converting at least a portion of the produced synthesis gas to methanol.

4689. The method of claim 4664, further comprising converting at least a portion of the produced synthesis gas to gasoline.

4690. The method of claim 4664, further comprising converting at least a portion of the synthesis gas to methane using a catalytic methanation process.

4691. The method of claim 4664, wherein a temperature of at least the one heat source wellbore is maintained at a temperature of less than approximately 700 °C to produce a synthesis gas having a ratio of H_2 to carbon monoxide of greater than about 2.

4692. The method of claim 4664, wherein a temperature of at least the one heat source wellbore is maintained at a temperature of greater than approximately 700 °C to produce a synthesis gas having a ratio of H_2 to carbon monoxide of less than about 2.

4693. The method of claim 4664, wherein a temperature of at least the one heat source wellbore is maintained at a temperature of approximately 700 °C to produce a synthesis gas having a ratio of H_2 to carbon monoxide of approximately 2.

4694. The method of claim 4664, wherein a heat source of the one or more heat sources comprises an electrical heater.

4695. The method of claim 4664, wherein a heat source of the one or more heat sources comprises a natural distributor heater.

4696. The method of claim 4664, wherein a heat source of the one or more heat sources comprises a flameless distributor combustor (FDC) heater, and wherein fluids are produced from the wellbore of the FDC heater through a conduit positioned within the wellbore.

4697. The method of claim 4664, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

4698. The method of claim 4664, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

4699. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation such that the heat from the one or more heat sources pyrolyzes at least a portion of hydrocarbon material within the selected section of the formation;

producing pyrolysis products from the formation;

heating a first portion of a formation with one or more heat sources to a temperature sufficient to allow generation of synthesis gas;

providing a first synthesis gas generating fluid to the first portion to generate a first synthesis gas;

removing a portion of the first synthesis gas from the formation;

heating a second portion of a formation with one more heat sources to a temperature sufficient to allow generation of synthesis gas having a H_2 to CO ratio greater than a H_2 to CO ratio of the first synthesis gas;

providing a second synthesis gas generating component to the second portion to generate a second synthesis gas;

removing a portion of the second synthesis gas from the formation; and

blending a portion of the first synthesis gas with a portion of the second synthesis gas to produce a blended synthesis gas having a selected H_2 to CO ratio.

4700. The method of claim 4699, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

4701. The method of claim 4699, wherein the first synthesis gas generating fluid and second synthesis gas generating fluid are the same component.

4702. The method of claim 4699, further comprising controlling the temperature in the first portion to control a composition of the first synthesis gas.

4703. The method of claim 4699, further comprising controlling the temperature in the second portion to control a composition of the second synthesis gas.

4704. The method of claim 4699, wherein the selected ratio is controlled to be approximately 2:1 H_2 to CO.

4705. The method of claim 4699, wherein the selected ratio is controlled to range from approximately 1.8:1 to approximately 2.2:1 H_2 to CO.

4706. The method of claim 4699, wherein the selected ratio is controlled to be approximately 3:1 H_2 to CO.

4707. The method of claim 4699, wherein the selected ratio is controlled to range from approximately 2.8:1 to approximately 3.2:1 H_2 to CO.

4708. The method of claim 4699, further comprising providing at least a portion of the produced blended synthesis gas to a condensable hydrocarbon synthesis process to produce condensable hydrocarbons.

4709. The method of claim 4708, wherein the condensable hydrocarbon synthesis process comprises a Fischer-Tropsch process.

4710. The method of claim 4709, further comprising cracking at least a portion of the condensable hydrocarbons to form middle distillates.

4711. The method of claim 4699, further comprising providing at least a portion of the produced blended synthesis gas to a catalytic methanation process to produce methane.

4712. The method of claim 4699, further comprising providing at least a portion of the produced blended synthesis gas to a methanol-synthesis process to produce methanol.

4713. The method of claim 4699, further comprising providing at least a portion of the produced blended synthesis gas to a gasoline-synthesis process to produce gasoline.

4714. The method of claim 4699, wherein removing a portion of the second synthesis gas comprises withdrawing second synthesis gas through a production well, wherein a temperature of the production well adjacent to a second syntheses gas production zone is maintained at a substantially constant temperature configured to produce second synthesis gas having the H_2 to CO ratio greater the first synthesis gas.

4715. The method of claim 4699, wherein the first synthesis gas producing fluid comprises CO_2 and wherein the temperature of the first portion is at a temperature that will result in conversion of CO_2 and carbon from the first portion to CO to generate a CO rich first synthesis gas.

4716. The method of claim 4699, wherein the second synthesis gas producing fluid comprises water and hydrocarbons having carbon numbers less than 5, and wherein at least a portion of the hydrocarbons react within the formation to increase a H_2 concentration within the produced second synthesis gas.

4717. The method of claim 4699, wherein blending a portion of the first synthesis gas with a portion of the second synthesis gas comprises producing an intermediate mixture having a H_2 to CO mixture of less than the selected ratio, and subjecting the intermediate mixture to a shift reaction to reduce an amount of CO and increase an amount of H_2 to produce the selected ratio of H_2 to CO.

4718. The method of claim 4699, further comprising removing an excess of first synthesis gas from the first portion to have an excess of CO, subjecting the first synthesis gas to a shift reaction to reduce an amount of CO and increase an amount of H_2 before blending the first synthesis gas with the second synthesis gas.

4719. The method of claim 4699, further comprising removing the first synthesis gas from the formation under pressure, and passing removed first synthesis gas through a turbine to generate electricity.

4720. The method of claim 4699, further comprising removing the second synthesis gas from the formation under pressure, and passing removed second synthesis gas through a turbine to generate electricity.

4721. The method of claim 4699, further comprising generating electricity from the blended synthesis gas using a fuel cell.

4722. The method of claim 4699, further comprising generating electricity from the blended synthesis gas using a fuel cell, separating carbon dioxide from a fluid exiting the fuel cell, and storing a portion of the separated carbon dioxide within a spent portion of the formation.

4723. The method of claim 4699, further comprising using at least a portion of the blended synthesis gas as a combustion fuel for heating the formation.

4724. The method of claim 4699, further comprising allowing the heat to transfer from the one or more heat sources to the selected section to substantially uniformly increase a permeability of the selected section.

4725. The method of claim 4699, further comprising controlling heat transfer from the one or more heat sources to produce a permeability within the selected section of greater than about 100 millidarcy.

4726. The method of claim 4699, further comprising heating at least the portion of the selected section when providing the synthesis gas generating fluid to inhibit temperature decrease within the selected section during synthesis gas generation.

4727. The method of claim 4699, wherein the temperature sufficient to allow synthesis gas generation is within a range from approximately 400 °C to approximately 1200 °C.

4728. The method of claim 4699, wherein heating the first a portion of the selected section to a temperature sufficient to allow synthesis gas generation comprises:

heating zones adjacent to wellbores of one or more heat sources with heaters disposed in the wellbores, wherein the heaters are configured to raise temperatures of the

zones to temperatures sufficient to support reaction of hydrocarbon material within the zones with an oxidizing fluid;

introducing the oxidizing fluid to the zones substantially by diffusion;

allowing the oxidizing fluid to react with at least a portion of the hydrocarbon material within the zones to produce heat in the zones; and

transferring heat from the zones to the selected section.

4729. The method of claim 4699, wherein heating the second portion of the selected section to a temperature sufficient to allow synthesis gas generation comprises:

heating zones adjacent to wellbores of one or more heat sources with heaters disposed in the wellbores, wherein the heaters are configured to raise temperatures of the zones to temperatures sufficient to support reaction of hydrocarbon material within the zones with an oxidizing fluid;

introducing the oxidizing fluid to the zones substantially by diffusion;

allowing the oxidizing fluid to react with at least a portion of the hydrocarbon material within the zones to produce heat in the zones; and

transferring heat from the zones to the selected section.

4730. The method of claim 4699, wherein heating the first portion of the selected section to a temperature sufficient to allow synthesis gas generation comprises:

introducing an oxidizing fluid into the formation through a wellbore;

transporting the oxidizing fluid substantially by convection into the first portion of the selected section, wherein the first portion of the selected section is at a temperature sufficient to support an oxidization reaction with the oxidizing fluid; and

reacting the oxidizing fluid within the first portion of the selected section to generate heat and raise the temperature of the first portion.

4731. The method of claim 4699, wherein heating the second portion of the selected section to a temperature sufficient to allow synthesis gas generation comprises:

introducing an oxidizing fluid into the formation through a wellbore;

transporting the oxidizing fluid substantially by convection into the second portion of the selected section, wherein the second portion of the selected section is at a temperature sufficient to support an oxidization reaction with the oxidizing fluid; and

reacting the oxidizing fluid within the second portion of the selected section to generate heat and raise the temperature of the second portion.

4732. The method of claim 4699, wherein the one or more heat sources comprise one or more electrical heaters disposed in the formation.

4733. The method of claim 4699, wherein the one or more heat sources comprises one or more natural distributor combustors.

4734. The method of claim 4699, wherein the one or more heat sources comprise one or more heater wells, wherein at least one heater well comprises a conduit disposed within the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

4735. The method of claim 4699, wherein heating the first portion of the selected section to a temperature sufficient to allow synthesis gas generation and providing a first synthesis gas generating fluid to the first portion of the selected section comprises introducing steam into the first portion.

4736. The method of claim 4699, wherein heating the second portion of the selected section to a temperature sufficient to allow synthesis gas generation and providing a second synthesis gas generating fluid to the second portion of the selected section comprises introducing steam into the second portion.

4737. The method of claim 4699, further comprising controlling the heating of the first portion of selected section and provision of the first synthesis gas generating fluid to maintain a temperature within the first portion of the selected section above the temperature sufficient to generate synthesis gas.

4738. The method of claim 4699, further comprising controlling the heating of the second portion of selected section and provision of the second synthesis gas generating fluid to maintain a temperature within the second portion of the selected section above the temperature sufficient to generate synthesis gas.

4739. The method of claim 4699, wherein the first synthesis gas generating fluid comprises liquid water.

4740. The method of claim 4699, wherein the second synthesis gas generating fluid comprises liquid water.

4741. The method of claim 4699, wherein the first synthesis gas generating fluid comprises steam.

4742. The method of claim 4699, wherein the second synthesis gas generating fluid comprises steam.

4743. The method of claim 4699, wherein the first synthesis gas generating fluid comprises water and carbon dioxide, wherein the carbon dioxide inhibits production of carbon dioxide from the selected section.

4744. The method of claim 4743, wherein a portion of the carbon dioxide within the first synthesis gas generating fluid comprises carbon dioxide removed from the formation.

4745. The method of claim 4699, wherein the second synthesis gas generating fluid comprises water and carbon dioxide, wherein the carbon dioxide inhibits production of carbon dioxide from the selected section.

4746. The method of claim 4745, wherein a portion of the carbon dioxide within the second synthesis gas generating fluid comprises carbon dioxide removed from the formation.

4747. The method of claim 4699, wherein the first synthesis gas generating fluid comprises carbon dioxide, and wherein a portion of the carbon dioxide reacts with carbon in the formation to generate carbon monoxide.

4748. The method of claim 4747, wherein a portion of the carbon dioxide within the first synthesis gas generating fluid comprises carbon dioxide removed from the formation.

4749. The method of claim 4699, wherein the second synthesis gas generating fluid comprises carbon dioxide, and wherein a portion of the carbon dioxide reacts with carbon in the formation to generate carbon monoxide.

4750. The method of claim 4749, wherein a portion of the carbon dioxide within the second synthesis gas generating fluid comprises carbon dioxide removed from the formation.

4751. The method of claim 4699, wherein providing the first synthesis gas generating fluid to the first portion of the selected section comprises raising a water table of the formation to allow water to flow into the first portion of the selected section.

4752. The method of claim 4699, wherein providing the second synthesis gas generating fluid to the second portion of the selected section comprises raising a water table of the formation to allow water to flow into the second portion of the selected section.

4753. The method of claim 4699, wherein the first synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers less than 5, and wherein at

least a portion of the hydrocarbons are subjected to a reaction within the first portion of the selected section to increase a H_2 concentration within the produced first synthesis gas.

4754. The method of claim 4699, wherein the second synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers less than 5, and wherein at least a portion of the hydrocarbons are subjected to a reaction within the second portion of the selected section to increase a H_2 concentration within the produced second synthesis gas.

4755. The method of claim 4699, wherein the first synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers greater than 4, and wherein at least a portion of the hydrocarbons react within the first portion of the selected section to increase an energy content of the produced first synthesis gas.

4756. The method of claim 4699, wherein the second synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers greater than 4, and wherein at least a portion of the hydrocarbons react within at least the second portion of the selected section to increase an energy content of the second produced synthesis gas.

4757. The method of claim 4699, further comprising maintaining a pressure within the formation during synthesis gas generation, and passing produced blended synthesis gas through a turbine to generate electricity.

4758. The method of claim 4699, further comprising generating electricity from the blended synthesis gas using a fuel cell.

4759. The method of claim 4699, further comprising generating electricity from the blended synthesis gas using a fuel cell, separating carbon dioxide from a fluid exiting the fuel cell, and storing a portion of the separated carbon dioxide within a spent section of the formation.

4760. The method of claim 4699, further comprising using a portion of the blended synthesis gas as a combustion fuel for the one or more heat sources.

4761. The method of claim 4699, further comprising using a portion of the first synthesis gas as a combustion fuel for the one or more heat sources.

4762. The method of claim 4699, further comprising using a portion of the second synthesis gas as a combustion fuel for the one or more heat sources.

4763. The method of claim 4699, further comprising using a portion of the blended synthesis gas as a combustion fuel for the one or more heat sources.

4764. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation such that the heat from the one or more heat sources pyrolyzes at least some of the hydrocarbons within the selected section of the formation;

producing pyrolysis products from the formation;

heating at least a portion of the selected section to a temperature sufficient to generate synthesis gas;

controlling a temperature of at least a portion of the selected section to generate synthesis gas having a selected H_2 to CO ratio;

providing a synthesis gas generating fluid to at least the portion of the selected section to generate synthesis gas; and

producing a portion of the synthesis gas from the formation.

4765. The method of claim 4764, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

4766. The method of claim 4764, wherein the selected ratio is controlled to be approximately 2:1 H_2 to CO.

4767. The method of claim 4764, wherein the selected ratio is controlled to range from approximately 1.8:1 to approximately 2.2:1 H_2 to CO.

4768. The method of claim 4764, wherein the selected ratio is controlled to be approximately 3:1 H_2 to CO.

4769. The method of claim 4764, wherein the selected ratio is controlled to range from approximately 2.8:1 to approximately 3.2:1 H_2 to CO.

4770. The method of claim 4764, further comprising providing at least a portion of the produced synthesis gas to a condensable hydrocarbon synthesis process to produce condensable hydrocarbons.

4771. The method of claim 4770, wherein the condensable hydrocarbon synthesis process comprises a Fischer-Tropsch process.

4772. The method of claim 4771, further comprising cracking at least a portion of the condensable hydrocarbons to form middle distillates.

4773. The method of claim 4764, further comprising providing at least a portion of the produced synthesis gas to a catalytic methanation process to produce methane.

4774. The method of claim 4764, further comprising providing at least a portion of the produced synthesis gas to a methanol-synthesis process to produce methanol.

4775. The method of claim 4764, further comprising providing at least a portion of the produced synthesis gas to a gasoline-synthesis process to produce gasoline.

4776. The method of claim 4764, further comprising allowing the heat to transfer from the one or more heat sources to the selected section to substantially uniformly increase a permeability of the selected section.

4777. The method of claim 4764, further comprising controlling heat transfer from the one or more heat sources to produce a permeability within the selected section of greater than about 100 millidarcy.

4778. The method of claim 4764, further comprising heating at least the portion of the selected section when providing the synthesis gas generating fluid to inhibit temperature decrease within the selected section during synthesis gas generation.

4779. The method of claim 4764, wherein the temperature sufficient to allow synthesis gas generation is within a range from approximately 400 °C to approximately 1200 °C.

4780. The method of claim 4764, wherein heating at least the portion of the selected section to a temperature sufficient to allow synthesis gas generation comprises:

heating zones adjacent to wellbores of one or more heat sources with heaters disposed in the wellbores, wherein the heaters are configured to raise temperatures of the zones to temperatures sufficient to support reaction of hydrocarbon material within the zones with an oxidizing fluid;

introducing the oxidizing fluid to the zones substantially by diffusion;

allowing the oxidizing fluid to react with at least a portion of the hydrocarbon material within the zones to produce heat in the zones; and

transferring heat from the zones to the selected section.

4781. The method of claim 4764, wherein heating at least the portion of the selected section to a temperature sufficient to allow synthesis gas generation comprises:

introducing an oxidizing fluid into the formation through a wellbore;

transporting the oxidizing fluid substantially by convection into the portion of the selected section, wherein the portion of the selected section is at a temperature sufficient to support an oxidization reaction with the oxidizing fluid; and

reacting the oxidizing fluid within the portion of the selected section to generate heat and raise the temperature of the portion.

4782. The method of claim 4764, wherein the one or more heat sources comprise one or more electrical heaters disposed in the formation.

4783. The method of claim 4764, wherein the one or more heat sources comprises one or more natural distributor combustors.

4784. The method of claim 4764, wherein the one or more heat sources comprise one or more heater wells, wherein at least one heater well comprises a conduit disposed within the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

4785. The method of claim 4764, wherein heating at least the portion of the selected section to a temperature sufficient to allow synthesis gas generation and providing a synthesis gas generating fluid to at least the portion of the selected section comprises introducing steam into the portion.

4786. The method of claim 4764, further comprising controlling the heating of at least the portion of selected section and provision of the synthesis gas generating fluid to maintain a temperature within at least the portion of the selected section above the temperature sufficient to generate synthesis gas.

4787. The method of claim 4764, wherein the synthesis gas generating fluid comprises liquid water.

4788. The method of claim 4764, wherein the synthesis gas generating fluid comprises steam.

4789. The method of claim 4764, wherein the synthesis gas generating fluid comprises water and carbon dioxide, wherein the carbon dioxide inhibits production of carbon dioxide from the selected section.

4790. The method of claim 4789, wherein a portion of the carbon dioxide within the synthesis gas generating fluid comprises carbon dioxide removed from the formation.

4791. The method of claim 4764, wherein the synthesis gas generating fluid comprises carbon dioxide, and wherein a portion of the carbon dioxide reacts with carbon in the formation to generate carbon monoxide.

4792. The method of claim 4791, wherein a portion of the carbon dioxide within the synthesis gas generating fluid comprises carbon dioxide removed from the formation.

4793. The method of claim 4764, wherein providing the synthesis gas generating fluid to at least the portion of the selected section comprises raising a water table of the formation to allow water to flow into the at least the portion of the selected section.

4794. The method of claim 4764, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers less than 5, and wherein at least a portion of the hydrocarbons are subjected to a reaction within at least the portion of the selected section to increase a H_2 concentration within the produced synthesis gas.

4795. The method of claim 4764, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers greater than 4, and wherein at least a portion of the hydrocarbons react within at least the portion of the selected section to increase an energy content of the produced synthesis gas.

4796. The method of claim 4764, further comprising maintaining a pressure within the formation during synthesis gas generation, and passing produced synthesis gas through a turbine to generate electricity.

4797. The method of claim 4764, further comprising generating electricity from the synthesis gas using a fuel cell.

4798. The method of claim 4764, further comprising generating electricity from the synthesis gas using a fuel cell, separating carbon dioxide from a fluid exiting the fuel cell, and storing a portion of the separated carbon dioxide within a spent section of the formation.

4799. The method of claim 4764, further comprising using a portion of the synthesis gas as a combustion fuel for the one or more heat sources.

4800. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation such that the heat from the one or more heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation;

producing pyrolysis products from the formation;

heating at least a portion of the selected section to a temperature sufficient to generate synthesis gas;

controlling a temperature in or proximate to a synthesis gas production well to generate synthesis gas having a selected H_2 to CO ratio;

providing a synthesis gas generating fluid to at least the portion of the selected section to generate synthesis gas; and

producing synthesis gas from the formation.

4801. The method of claim 4800, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

4802. The method of claim 4800, wherein the selected ratio is controlled to be approximately 2:1 H_2 to CO.

4803. The method of claim 4800, wherein the selected ratio is controlled to range from approximately 1.8:1 to approximately 2.2:1 H_2 to CO.

4804. The method of claim 4800, wherein the selected ratio is controlled to be approximately 3:1 H_2 to CO.

4805. The method of claim 4800, wherein the selected ratio is controlled to range from approximately 2.8:1 to approximately 3.2:1 H_2 to CO.

4806. The method of claim 4800, further comprising providing at least a portion of the produced synthesis gas to a condensable hydrocarbon synthesis process to produce condensable hydrocarbons.

4807. The method of claim 4806, wherein the condensable hydrocarbon synthesis process comprises a Fischer-Tropsch process.

4808. The method of claim 4807, further comprising cracking at least a portion of the condensable hydrocarbons to form middle distillates.

4809. The method of claim 4800, further comprising providing at least a portion of the produced synthesis gas to a catalytic methanation process to produce methane.

4810. The method of claim 4800, further comprising providing at least a portion of the produced synthesis gas to a methanol-synthesis process to produce methanol.

4811. The method of claim 4800, further comprising providing at least a portion of the produced synthesis gas to a gasoline-synthesis process to produce gasoline.

4812. The method of claim 4800, further comprising allowing the heat to transfer from the one or more heat sources to the selected section to substantially uniformly increase a permeability of the selected section.

4813. The method of claim 4800, further comprising controlling heat transfer from the one or more heat sources to produce a permeability within the selected section of greater than about 100 millidarcy.

4814. The method of claim 4800, further comprising heating at least the portion of the selected section when providing the synthesis gas generating fluid to inhibit temperature decrease within the selected section during synthesis gas generation.

4815. The method of claim 4800, wherein the temperature sufficient to allow synthesis gas generation is within a range from approximately 400 °C to approximately 1200 °C.

4816. The method of claim 4800, wherein heating at least the portion of the selected section to a temperature sufficient to allow synthesis gas generation comprises:

heating zones adjacent to wellbores of one or more heat sources with heaters disposed in the wellbores, wherein the heaters are configured to raise temperatures of the zones to temperatures sufficient to support reaction of hydrocarbon material within the zones with an oxidizing fluid;

introducing the oxidizing fluid to the zones substantially by diffusion;

allowing the oxidizing fluid to react with at least a portion of the hydrocarbon material within the zones to produce heat in the zones; and

transferring heat from the zones to the selected section.

4817. The method of claim 4800, wherein heating at least the portion of the selected section to a temperature sufficient to allow synthesis gas generation comprises:

introducing an oxidizing fluid into the formation through a wellbore;

transporting the oxidizing fluid substantially by convection into the portion of the selected section, wherein the portion of the selected section is at a temperature sufficient to support an oxidization reaction with the oxidizing fluid; and

reacting the oxidizing fluid within the portion of the selected section to generate heat and raise the temperature of the portion.

4818. The method of claim 4800, wherein the one or more heat sources comprise one or more electrical heaters disposed in the formation.

4819. The method of claim 4800, wherein the one or more heat sources comprises one or more natural distributor combustors.

4820. The method of claim 4800, wherein the one or more heat sources comprise one or more heater wells, wherein at least one heater well comprises a conduit disposed within the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

4821. The method of claim 4800, wherein heating at least the portion of the selected section to a temperature sufficient to allow synthesis gas generation and providing a synthesis gas generating fluid to at least the portion of the selected section comprises introducing steam into the portion.

4822. The method of claim 4800, further comprising controlling the heating of at least the portion of selected section and provision of the synthesis gas generating fluid to maintain a temperature within at least the portion of the selected section above the temperature sufficient to generate synthesis gas.

4823. The method of claim 4800, wherein the synthesis gas generating fluid comprises liquid water.

4824. The method of claim 4800, wherein the synthesis gas generating fluid comprises steam.

4825. The method of claim 4800, wherein the synthesis gas generating fluid comprises water and carbon dioxide.

4826. The method of claim 4825, wherein a portion of the carbon dioxide within the synthesis gas generating fluid comprises carbon dioxide removed from the formation.

4827. The method of claim 4800, wherein the synthesis gas generating fluid comprises carbon dioxide, and wherein a portion of the carbon dioxide reacts with carbon in the formation to generate carbon monoxide.

4828. The method of claim 4827, wherein a portion of the carbon dioxide within the synthesis gas generating fluid comprises carbon dioxide removed from the formation.

4829. The method of claim 4800, wherein providing the synthesis gas generating fluid to at least the portion of the selected section comprises raising a water table of the formation to allow water to flow into the at least the portion of the selected section.

4830. The method of claim 4800, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers less than 5, and wherein at least a portion of the hydrocarbons are subjected to a reaction within at least the portion of the selected section to increase a H_2 concentration within the produced synthesis gas.

4831. The method of claim 4800, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers greater than 4, and wherein at least a

portion of the hydrocarbons react within at least the portion of the selected section to increase an energy content of the produced synthesis gas.

4832. The method of claim 4800, further comprising maintaining a pressure within the formation during synthesis gas generation, and passing produced synthesis gas through a turbine to generate electricity.

4833. The method of claim 4800, further comprising generating electricity from the synthesis gas using a fuel cell.

4834. The method of claim 4800, further comprising generating electricity from the synthesis gas using a fuel cell, separating carbon dioxide from a fluid exiting the fuel cell, and storing a portion of the separated carbon dioxide within a spent section of the formation.

4835. The method of claim 4800, further comprising using a portion of the synthesis gas as a combustion fuel for the one or more heat sources.

4836. A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation such that the heat from the one or more heat sources pyrolyzes at least some of the hydrocarbons within the selected section of the formation;

producing pyrolysis products from the formation;

heating at least a portion of the selected section to a temperature sufficient to generate synthesis gas;

controlling a temperature of at least a portion of the selected section to generate synthesis gas having a H_2 to CO ratio different than a selected H_2 to CO ratio;

providing a synthesis gas generating fluid to at least the portion of the selected section to generate synthesis gas; and

producing synthesis gas from the formation;

providing at least a portion of the produced synthesis gas to a shift process wherein an amount of carbon monoxide is converted to carbon dioxide;

separating at least a portion of the carbon dioxide to obtain a gas having a selected H_2 to CO ratio.

4837. The method of claim 4836, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

4838. The method of claim 4836, wherein the selected ratio is controlled to be approximately 2:1 H_2 to CO.

4839. The method of claim 4836, wherein the selected ratio is controlled to range from approximately 1.8:1 to 2.2:1 H_2 to CO.

4840. The method of claim 4836, wherein the selected ratio is controlled to be approximately 3:1 H_2 to CO.

4841. The method of claim 4836, wherein the selected ratio is controlled to range from approximately 2.8:1 to 3.2:1 H_2 to CO.

4842. The method of claim 4836, further comprising providing at least a portion of the produced synthesis gas to a condensable hydrocarbon synthesis process to produce condensable hydrocarbons.

4843. The method of claim 4842, wherein the condensable hydrocarbon synthesis process comprises a Fischer-Tropsch process.

4844. The method of claim 4843, further comprising cracking at least a portion of the condensable hydrocarbons to form middle distillates.

4845. The method of claim 4836, further comprising providing at least a portion of the produced synthesis gas to a catalytic methanation process to produce methane.

4846. The method of claim 4836, further comprising providing at least a portion of the produced synthesis gas to a methanol-synthesis process to produce methanol.

4847. The method of claim 4836, further comprising providing at least a portion of the produced synthesis gas to a gasoline-synthesis process to produce gasoline.

4848. The method of claim 4836, further comprising allowing the heat to transfer from the one or more heat sources to the selected section to substantially uniformly increase a permeability of the selected section.

4849. The method of claim 4836, further comprising controlling heat transfer from the one or more heat sources to produce a permeability within the selected section of greater than about 100 millidarcy.

4850. The method of claim 4836, further comprising heating at least the portion of the selected section when providing the synthesis gas generating fluid to inhibit temperature decrease within the selected section during synthesis gas generation.

4851. The method of claim 4836, wherein the temperature sufficient to allow synthesis gas generation is within a range from approximately 400 °C to approximately 1200 °C.

4852. The method of claim 4836, wherein heating at least the portion of the selected section to a temperature sufficient to allow synthesis gas generation comprises:

heating zones adjacent to wellbores of one or more heat sources with heaters disposed in the wellbores, wherein the heaters are configured to raise temperatures of the

zones to temperatures sufficient to support reaction of hydrocarbon material within the zones with an oxidizing fluid;

introducing the oxidizing fluid to the zones substantially by diffusion;

allowing the oxidizing fluid to react with at least a portion of the hydrocarbon material within the zones to produce heat in the zones; and

transferring heat from the zones to the selected section.

4853. The method of claim 4836, wherein heating at least the portion of the selected section to a temperature sufficient to allow synthesis gas generation comprises:

introducing an oxidizing fluid into the formation through a wellbore;

transporting the oxidizing fluid substantially by convection into the portion of the selected section, wherein the portion of the selected section is at a temperature sufficient to support an oxidization reaction with the oxidizing fluid; and

reacting the oxidizing fluid within the portion of the selected section to generate heat and raise the temperature of the portion.

4854. The method of claim 4836, wherein the one or more heat sources comprise one or more electrical heaters disposed in the formation.

4855. The method of claim 4836, wherein the one or more heat sources comprises one or more natural distributor combustors.

4856. The method of claim 4836, wherein the one or more heat sources comprise one or more heater wells, wherein at least one heater well comprises a conduit disposed within the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

4857. The method of claim 4836, wherein heating at least the portion of the selected section to a temperature sufficient to allow synthesis gas generation and providing a synthesis gas generating fluid to at least the portion of the selected section comprises introducing steam into the portion.

4858. The method of claim 4836, further comprising controlling the heating of at least the portion of selected section and provision of the synthesis gas generating fluid to maintain a temperature within at least the portion of the selected section above the temperature sufficient to generate synthesis gas.

4859. The method of claim 4836, wherein the synthesis gas generating fluid comprises liquid water.

4860. The method of claim 4836, wherein the synthesis gas generating fluid comprises steam.

4861. The method of claim 4836, wherein the synthesis gas generating fluid comprises water and carbon dioxide, wherein the carbon dioxide inhibits production of carbon dioxide from the selected section.

4862. The method of claim 4861, wherein a portion of the carbon dioxide within the synthesis gas generating fluid comprises carbon dioxide removed from the formation.

4863. The method of claim 4836, wherein the synthesis gas generating fluid comprises carbon dioxide, and wherein a portion of the carbon dioxide reacts with carbon in the formation to generate carbon monoxide.

4864. The method of claim 4863, wherein a portion of the carbon dioxide within the synthesis gas generating fluid comprises carbon dioxide removed from the formation.

4865. The method of claim 4836, wherein providing the synthesis gas generating fluid to at least the portion of the selected section comprises raising a water table of the formation to allow water to flow into the at least the portion of the selected section.

4866. The method of claim 4836, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers less than 5, and wherein at least a portion of the hydrocarbons are subjected to a reaction within at least the portion of the selected section to increase a H_2 concentration within the produced synthesis gas.

4867. The method of claim 4836, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers greater than 4, and wherein at least a portion of the hydrocarbons react within at least the portion of the selected section to increase an energy content of the produced synthesis gas.

4868. The method of claim 4836, further comprising maintaining a pressure within the formation during synthesis gas generation, and passing produced synthesis gas through a turbine to generate electricity.

4869. The method of claim 4836, further comprising generating electricity from the synthesis gas using a fuel cell.

4870. The method of claim 4836, further comprising generating electricity from the synthesis gas using a fuel cell, separating carbon dioxide from a fluid exiting the fuel cell, and storing a portion of the separated carbon dioxide within a spent section of the formation.

4871. The method of claim 4836, further comprising using a portion of the synthesis gas as a combustion fuel for the one or more heat sources.

4872. A method of forming a spent portion of formation within a coal formation, comprising:

heating a first portion of the formation to pyrolyze hydrocarbons within the first portion and to establish a substantially uniform permeability within the first portion; and

cooling the first portion.

4873. The method of claim 4872, wherein heating the first portion comprises transferring heat to the first portion from one or more electrical heaters.

4874. The method of claim 4872, wherein heating the first portion comprises transferring heat to the first portion from one or more natural distributor combustors.

4875. The method of claim 4872, wherein heating the first portion comprises transferring heat to the first portion from one or more flameless distributor combustors.

4876. The method of claim 4872, wherein heating the first portion comprises transferring heat to the first portion from heat transfer fluid flowing within one or more wellbores within the formation.

4877. The method of claim 4876, wherein the heat transfer fluid comprises steam.

4878. The method of claim 4876, wherein the heat transfer fluid comprises combustion products from a burner.

4879. The method of claim 4872, wherein heating the first portion comprises transferring heat to the first portion from at least two heater wells positioned within the formation, wherein the at least two heater wells are placed in a substantially regular pattern, wherein the substantially regular pattern comprises repetition of a base heater unit, and wherein the base heater unit is formed of a number of heater wells.

4880. The method of claim 4879, wherein a spacing between a pair of adjacent heater wells is within a range from about 6 m to about 15 m.

4881. The method of claim 4879, further comprising removing fluid from the formation through one or more production wells.

4882. The method of claim 4881, wherein the one or more production wells are located in a pattern, and wherein the one or more production wells are positioned substantially at centers of base heater units.

4883. The method of claim 4879, wherein the heater unit comprises three heater wells positioned substantially at apexes of an equilateral triangle.

4884. The method of claim 4879, wherein the heater unit comprises four heater wells positioned substantially at apexes of a rectangle.

4885. The method of claim 4879, wherein the heater unit comprises five heater wells positioned substantially at apexes of a regular pentagon.

4886. The method of claim 4879, wherein the heater unit comprises six heater wells positioned substantially at apexes of a regular hexagon.

4887. The method of claim 4872, further comprising introducing water to the first portion to cool the formation.

4888. The method of claim 4872, further comprising removing steam from the formation.

4889. The method of claim 4888, further comprising using a portion of the removed steam to heat a second portion of the formation.

4890. The method of claim 4872, further comprising removing pyrolyzation products from the formation.

4891. The method of claim 4872, further comprising generating synthesis gas within the portion by introducing a synthesis gas generating fluid into the portion, and removing synthesis gas from the formation.

4892. The method of claim 4872, further comprising heating a second section of the formation to pyrolyze hydrocarbons within the second portion, removing pyrolyzation fluid from the second portion, and storing a portion of the removed pyrolyzation fluid within the first portion.

4893. The method of claim 4892, wherein the portion of the removed pyrolyzation fluid is stored within the first portion when surface facilities that process the removed pyrolyzation fluid are not able to process the portion of the removed pyrolyzation fluid.

4894. The method of claim 4892, further comprising heating the first portion to facilitate removal of the stored pyrolyzation fluid from the first portion.

4895. The method of claim 4872, further comprising generating synthesis gas within a second portion of the formation, removing synthesis gas from the second portion, and storing a portion of the removed synthesis gas within the first portion.

4896. The method of claim 4895, wherein the portion of the removed synthesis gas from the second portion are stored within the first portion when surface facilities that process the removed synthesis gas are not able to process the portion of the removed synthesis gas.

4897. The method of claim 4895, further comprising heating the first portion to facilitate removal of the stored synthesis gas from the first portion.

4898. The method of claim 4872, further comprising removing at least a portion of carbon containing material in the first portion.

4899. The method of claim 4898, further comprising using at least a portion of the carbon containing material removed from the formation in a metallurgical application.

4900. The method of claim 4899, wherein the metallurgical application comprises steel manufacturing.

4901. A method of sequestering carbon dioxide within a coal formation, comprising:

heating a portion of the formation to increase permeability and form a substantially uniform permeability within the portion;

allowing the portion to cool; and

storing carbon dioxide within the portion.

4902. The method of claim 4901, wherein the permeability of the portion is increased to over 100 millidarcy.

4903. The method of claim 4901, further comprising raising a water level within the portion to inhibit migration of the carbon dioxide from the portion.

4904. The method of claim 4901, further comprising heating the portion to release carbon dioxide, and removing carbon dioxide from the portion.

4905. The method of claim 4901, further comprising pyrolyzing hydrocarbons within the portion during heating of the portion, and removing pyrolyzation product from the formation.

4906. The method of claim 4901, further comprising producing synthesis gas from the portion during the heating of the portion, and removing synthesis gas from the formation.

4907. The method of claim 4901, wherein heating the portion comprises:

heating hydrocarbon material adjacent to one or more wellbores to a temperature sufficient to support oxidation of the hydrocarbon material with an oxidizing fluid;

introducing the oxidizing fluid to hydrocarbon material adjacent to the one or more wellbores to oxidize hydrocarbons and produce heat; and

conveying produced heat to the portion.

4908. The method of claim 4907, wherein heating hydrocarbon material adjacent to the one or more wells comprises electrically heating the hydrocarbon material.

4909. The method of claim 4907, wherein the temperature sufficient to support oxidation is in a range between approximately 200°C to approximately 1200 °C.

4910. The method of claim 4901, wherein heating the portion comprises circulating heat transfer fluid through one or more heating wells within the formation.

4911. The method of claim 4910, wherein the heat transfer fluid comprises combustion products from a burner.

4912. The method of claim 4910, wherein the heat transfer fluid comprises steam.

4913. The method of claim 4901, further comprising removing fluid from the formation during heating of the formation, and combusting a portion of the removed fluid to generate heat to heat the formation.

4914. The method of claim 4901, further comprising using at least a portion of the carbon dioxide for hydrocarbon bed demethanation prior to storing the carbon dioxide within the portion.

4915. The method of claim 4901, further comprising using a portion of the carbon dioxide for enhanced oil recovery prior to storing the carbon dioxide within the portion.

4916. The method of claim 4901, wherein at least a portion of the carbon dioxide comprises carbon dioxide generated in a fuel cell.

4917. The method of claim 4901, wherein at least a portion of the carbon dioxide comprises carbon dioxide formed as a combustion product.

4918. The method of claim 4901, further comprising allowing the portion to cool by introducing water to the portion; and removing the water from the formation as steam.

4919. The method of claim 4918, further comprising using the steam as a heat transfer fluid to heat a second portion of the formation.

4920. The method of claim 4901, wherein storing carbon dioxide in the portion comprises adsorbing carbon dioxide to carbon containing material within the formation.

4921. The method of claim 4901, wherein storing carbon dioxide comprises passing a first fluid stream comprising the carbon dioxide and other fluid through the portion; adsorbing carbon dioxide onto carbon containing material within the formation; and removing a second fluid stream from the formation, wherein a concentration of the other fluid in the second fluid stream is greater than concentration of other fluid in the first stream due to the absence of the adsorbed carbon dioxide in the second stream.

4922. The method of claim 4901, wherein an amount of carbon dioxide stored within the portion is equal to or greater than an amount of carbon dioxide generated within the portion and removed from the formation during heating of the portion.

4923. The method of claim 4901, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

4924. The method of claim 4901, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

4925. A method of in situ sequestration of carbon dioxide within a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a first portion of the formation;

allowing the heat to transfer from one or more sources to a selected section of the formation such that the heat from the one or more heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation;

producing pyrolyzation fluids, wherein the pyrolyzation fluids comprise carbon dioxide; and

storing an amount of carbon dioxide in the formation, wherein the amount of stored carbon dioxide is equal to or greater than an amount of carbon dioxide within the pyrolyzation fluids.

4926. The method of claim 4925, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

4927. The method of claim 4925, wherein the carbon dioxide is stored within a spent portion of the formation.

4928. The method of claim 4925, wherein a portion of the carbon dioxide stored within the formation is carbon dioxide separated from the pyrolyzation fluids.

4929. The method of claim 4925, further comprising separating a portion of carbon dioxide from the pyrolyzation fluids, and using the carbon dioxide as a flooding agent in enhanced oil recovery.

4930. The method of claim 4925, further comprising separating a portion of carbon dioxide from the pyrolyzation fluids, and using the carbon dioxide as a synthesis gas

generating fluid for the generation of synthesis gas from a section of the formation that is heated to a temperature sufficient to generate synthesis gas upon introduction of the synthesis gas generating fluid.

4931. The method of claim 4925, further comprising separating a portion of carbon dioxide from the pyrolyzation fluids, and using the carbon dioxide to displace hydrocarbon bed methane.

4932. The method of claim 4931, wherein the hydrocarbon bed is a deep hydrocarbon bed located over 760 m below ground surface.

4933. The method of claim 4931, further comprising adsorbing a portion of the carbon dioxide within the hydrocarbon bed.

4934. The method of claim 4925, further comprising using at least a portion of the pyrolyzation fluids as a feed stream for a fuel cell.

4935. The method of claim 4934, wherein the fuel cell generates carbon dioxide, and further comprising storing an amount of carbon dioxide equal to or greater than an amount of carbon dioxide generated by the fuel cell within the formation.

4936. The method of claim 4925, wherein a spent portion of the formation comprises carbon containing material within a section of the formation that has been heated and from which hydrocarbons have been produced, and wherein the spent portion of the formation is at a temperature at which carbon dioxide adsorbs onto the carbon containing material.

4937. The method of claim 4925, further comprising raising a water level within the spent portion to inhibit migration of the carbon dioxide from the portion.

4938. The method of claim 4925, wherein producing fluids from the formation comprises removing pyrolyzation products from the formation.

4939. The method of claim 4925, wherein producing fluids from the formation comprises heating the selected section to a temperature sufficient to generate synthesis gas; introducing a synthesis gas generating fluid into the selected section; and removing synthesis gas from the formation.

4940. The method of claim 4939, wherein the temperature sufficient to generate synthesis gas ranges from about 400 °C to about 1200 °C.

4941. The method of claim 4939, wherein heating the selected section comprises introducing an oxidizing fluid into the selected section, reacting the oxidizing fluid within the selected section to heat the selected section.

4942. The method of claim 4939, wherein heating the selected section comprises:

heating hydrocarbon material adjacent to one or more wellbores to a temperature sufficient to support oxidation of the hydrocarbon material with an oxidant;

introducing the oxidant to hydrocarbon material adjacent to the one or more wellbores to oxidize hydrocarbons and produce heat; and

conveying produced heat to the portion.

4943. The method of claim 4925, wherein the spent portion of the formation comprises a substantially uniform permeability created by heating the spent formation and removing fluid during formation of the spent portion.

4944. The method of claim 4925, wherein the one or more heat sources comprise electrical heaters.

4945. The method of claim 4925, wherein the one or more heat sources comprise flameless distributor combustors.

4946. The method of claim 4945, wherein a portion of fuel for the one or more flameless distributor combustors is obtained from the formation.

4947. The method of claim 4925, wherein the one or more heat sources comprise heater wells in the formation through which heat transfer fluid is circulated.

4948. The method of claim 4947, wherein the heat transfer fluid comprises combustion products.

4949. The method of claim 4947, wherein the heat transfer fluid comprises steam.

4950. The method of claim 4925, wherein condensable hydrocarbons are produced under pressure, and further comprising generating electricity by passing a portion of the produced fluids through a turbine.

4951. The method of claim 4925, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

4952. The method of claim 4925, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

4953. A method for in situ production of energy from a coal formation, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation such that the heat from the one or more heat sources pyrolyzes at least a portion of hydrocarbons within the selected section of the formation;

producing pyrolysis products from the formation;

providing at least a portion of the pyrolysis products to a reformer to generate synthesis gas;

producing the synthesis gas from the reformer;

providing at least a portion of the produced synthesis gas to a fuel cell to produce electricity, wherein the fuel cell produces a carbon dioxide containing exit stream; and

storing at least a portion of the carbon dioxide in the carbon dioxide containing exit stream in a subsurface formation.

4954. The method of claim 4953, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

4955. The method of claim 4953, wherein at least a portion of the pyrolysis products are used as fuel in the reformer.

4956. The method of claim 4953, wherein the synthesis gas comprises carbon dioxide and H_2.

4957. The method of claim 4953, wherein the subsurface formation is a spent portion of the formation.

4958. The method of claim 4953, wherein the subsurface formation is an oil reservoir.

4959. The method of claim 4958, wherein at least a portion of the carbon dioxide is used as a drive fluid for enhanced oil recovery in the oil reservoir.

4960. The method of claim 4953, wherein the subsurface formation is a second coal formation.

4961. The method of claim 4960, wherein the second coal formation is located greater than about 760 m below ground surface.

4962. The method of claim 4960, wherein at least a portion of the carbon dioxide is used to produce methane from the second coal formation.

4963. The method of claim 4962, further comprising sequestering at least a portion of the carbon dioxide within the second coal formation.

4964. The method of claim 4953, wherein the reformer produces a reformer carbon dioxide containing exit stream.

4965. The method of claim 4963, further comprising storing at least a portion of the carbon dioxide in the reformer carbon dioxide containing exit stream in the subsurface formation.

4966. The method of claim 4965, wherein the subsurface formation is a spent portion of the formation.

4967. The method of claim 4965, wherein the subsurface formation is an oil reservoir.

4968. The method of claim 4967, wherein at least a portion of the carbon dioxide in the reformer carbon dioxide containing exit stream is used as a drive fluid for enhanced oil recovery in the oil reservoir.

4969. The method of claim 4965, wherein the subsurface formation is a second coal formation.

4970. The method of claim 4868, wherein at least a portion of the carbon dioxide in the reformer carbon dioxide containing exit stream is used to produce methane from the second coal formation.

4971. The method of claim 4970, further comprising sequestering at least a portion of the carbon dioxide in the reformer carbon dioxide containing exit stream within the second coal formation.

4972. The method of claim 4969, wherein the second coal formation is located greater than about 760 m below ground surface.

4973. The method of claim 4953, wherein the fuel cell is a molten carbonate fuel cell.

4974. The method of claim 4953, wherein the fuel cell is a solid oxide fuel cell.

4975. The method of claim 4953, further comprising using a portion of the produced electricity to power electrical heaters within the formation.

4976. The method of claim 4953, further comprising using a portion of the produced pyrolysis products as a feed stream for the fuel cell.

4977. The method of claim 4953, wherein the one or more heat sources comprise one or more electrical heaters disposed in the formation.

4978. The method of claim 4953, wherein the one or more heat sources comprise one or more flameless distributor combustors disposed in the formation.

4979. The method of claim 4978, wherein a portion of fuel for the flameless distributor combustors is obtained from the formation.

4980. The method of claim 4953, wherein the one or more heat sources comprise one or more heater wells, wherein at least one heater well comprises a conduit disposed within the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

4981. The method of claim 4953, further comprising using a portion of the synthesis gas as a combustion fuel for the one or more heat sources.

4982. A method for producing ammonia using a coal formation, comprising:

separating air to produce an O_2 rich stream and a N_2 rich stream;

heating a selected section of the formation to a temperature sufficient to support reaction of hydrocarbon material in the formation to form synthesis gas;

providing synthesis gas generating fluid and at least a portion of the O_2 rich stream to the selected section;

allowing the synthesis gas generating fluid and O_2 in the O_2 rich stream to react with at least a portion of the hydrocarbon material in the formation to generate synthesis gas;

producing synthesis gas from the formation, wherein the synthesis gas comprises H_2 and CO;

providing at least a portion of the H_2 in the synthesis gas to an ammonia synthesis process;

providing N_2 to the ammonia synthesis process; and

using the ammonia synthesis process to generate ammonia.

4983. The method of claim 4982, wherein the ratio of the H_2 to N_2 provided to the ammonia synthesis process is approximately 3:1.

4984. The method of claim 4982, wherein the ratio of the H_2 to N_2 provided to the ammonia synthesis process ranges from approximately 2.8:1 to approximately 3.2:1.

4985. The method of claim 4982, wherein the temperature sufficient to support reaction of hydrocarbon material in the formation to form synthesis gas ranges from approximately 400 °C to approximately 1200 °C.

4986. The method of claim 4982, further comprising separating at least a portion of carbon dioxide in the synthesis gas from at least a portion of the synthesis gas.

4987. The method of claim 4986, wherein the carbon dioxide is separated from the synthesis gas by an amine separator.

4988. The method of claim 4987, further comprising providing at least a portion of the carbon dioxide to a urea synthesis process to produce urea.

4989. The method of claim 4982, wherein at least a portion of the N_2 stream is used to condense hydrocarbons with 4 or more carbon atoms from a pyrolyzation fluid.

4990. The method of claim 4982, wherein at least a portion of the N_2 rich stream is provided to the ammonia synthesis process.

4991. The method of claim 4982, wherein the air is separated by cryogenic distillation.

4992. The method of claim 4982, wherein the air is separated by membrane separation.

4993. The method of claim 4982, wherein fluids produced during pyrolysis of a coal formation comprise ammonia and, further comprising adding at least a portion of such ammonia to the ammonia generated from the ammonia synthesis process.

4994. The method of claim 4982, wherein fluids produced during pyrolysis of a coal formation are hydrotreated and at least some ammonia is produced during hydrotreating, and, further comprising adding at least a portion of such ammonia to the ammonia generated from the ammonia synthesis process.

4995. The method of claim 4982, further comprising providing at least a portion of the ammonia to a urea synthesis process to produce urea.

4996. The method of claim 4982, further comprising providing at least a portion of the ammonia to a urea synthesis process to produce urea and, further comprising providing carbon dioxide from the formation to the urea synthesis process.

4997. The method of claim 4982, further comprising providing at least a portion of the ammonia to a urea synthesis process to produce urea and, further comprising shifting at least a portion of the carbon monoxide to carbon dioxide in a shift process, and further comprising providing at least a portion of the carbon dioxide from the shift process to the urea synthesis process.

4998. The method of claim 4982, wherein heating the selected section of the formation to a temperature to support reaction of hydrocarbon material in the formation to form synthesis gas comprises:

heating zones adjacent to wellbores of one or more heat sources with heaters disposed in the wellbores, wherein the heaters are configured to raise temperatures of the zones to temperatures sufficient to support reaction of hydrocarbon material within the zones with O_2 in the O_2 rich stream;

introducing the O_2 to the zones substantially by diffusion;

allowing O_2 in the O_2 rich stream to react with at least a portion of the hydrocarbon material within the zones to produce heat in the zones; and

transferring heat from the zones to the selected section.

4999. The method of claim 4998, wherein temperatures sufficient to support reaction of hydrocarbon within the zones with O_2 range from approximately 200 °C to approximately 1200 °C.

5000. The method of claim 4998, wherein the one or more heat sources comprises one or more electrical heaters disposed in the formation.

5001. The method of claim 4998, wherein the one or more heat sources comprises one or more natural distributor combustors.

5002. The method of claim 4998, wherein the one or more heat sources comprise one or more heater wells, wherein at least one heater well comprises a conduit disposed within the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

5003. The method of claim 4998, further comprising using a portion of the synthesis gas as a combustion fuel for the one or more heat sources.

5004. The method of claim 4982, wherein heating the selected section of the formation to a temperature to support reaction of hydrocarbon material in the formation to form synthesis gas comprises:

introducing the O_2 rich stream into the formation through a wellbore;

transporting O_2 in the O_2 rich stream substantially by convection into the portion of the selected section, wherein the portion of the selected section is at a temperature sufficient to support an oxidization reaction with O_2 in the O_2 rich stream; and

reacting the O_2 within the portion of the selected section to generate heat and raise the temperature of the portion.

5005. The method of claim 5005, wherein the temperature sufficient to support an oxidization reaction with O_2 ranges from approximately 200 °C to approximately 1200 °C.

5006. The method of claim 5005, wherein the one or more heat sources comprises one or more electrical heaters disposed in the formation.

5007. The method of claim 5005, wherein the one or more heat sources comprises one or more natural distributor combustors.

5008. The method of claim 5005, wherein the one or more heat sources comprise one or more heater wells, wherein at least one heater well comprises a conduit disposed within the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

5009. The method of claim 5005, further comprising using a portion of the synthesis gas as a combustion fuel for the one or more heat sources.

5010. The method of claim 4982, further comprising controlling the heating of at least the portion of the selected section and provision of the synthesis gas generating fluid to maintain a temperature within at least the portion of the selected section above the temperature sufficient to generate synthesis gas.

5011. The method of claim 4982, wherein the synthesis gas generating fluid comprises liquid water.

5012. The method of claim 4982, wherein the synthesis gas generating fluid comprises steam.

5013. The method of claim 4982, wherein the synthesis gas generating fluid comprises water and carbon dioxide wherein the carbon dioxide inhibits production of carbon dioxide from the selected section.

5014. The method of claim 5013, wherein a portion of the carbon dioxide within the synthesis gas generating fluid comprises carbon dioxide removed from the formation.

5015. The method of claim 4982, wherein the synthesis gas generating fluid comprises carbon dioxide, and wherein a portion of the carbon dioxide reacts with carbon in the formation to generate carbon monoxide.

5016. The method of claim 5015, wherein a portion of the carbon dioxide within the synthesis gas generating fluid comprises carbon dioxide removed from the formation.

5017. The method of claim 4982, wherein providing the synthesis gas generating fluid to at least the portion of the selected section comprises raising a water table of the formation to allow water to flow into the at least the portion of the selected section.

5018. A method for producing ammonia using a coal formation, comprising:

generating a first ammonia feed stream from a first portion of the formation;

generating a second ammonia feed stream from a second portion of the formation, wherein the second ammonia feed stream has a H_2 to N_2 ratio greater than a H_2 to N_2 ratio of the first ammonia feed stream;

blending at least a portion of the first ammonia feed stream with at least a portion of the second ammonia feed stream to produce a blended ammonia feed stream having a selected H_2 to N_2 ratio;

providing the blended ammonia feed stream to an ammonia synthesis process; and

using the ammonia synthesis process to generate ammonia.

5019. The method of claim 5018, wherein the selected ratio is approximately 3:1.

5020. The method of claim 5018, wherein the selected ratio ranges from approximately 2.8:1 to approximately 3.2:1.

5021. The method of claim 5018, further comprising separating at least a portion of carbon dioxide in the first ammonia feed stream from at least a portion of the first ammonia feed stream.

5022. The method of claim 5021, wherein the carbon dioxide is separated from the first ammonia feed stream by an amine separator.

5023. The method of claim 5022, further comprising providing at least a portion of the carbon dioxide to a urea synthesis process.

5024. The method of claim 5018, further comprising separating at least a portion of carbon dioxide in the blended ammonia feed stream from at least a portion of the blended ammonia feed stream.

5025. The method of claim 5024, wherein the carbon dioxide is separated from the blended ammonia feed stream by an amine separator.

5026. The method of claim 5025, further comprising providing at least a portion of the carbon dioxide to a urea synthesis process

5027. The method of claim 5018, further comprising separating at least a portion of carbon dioxide in the second ammonia feed stream from at least a portion of the second ammonia feed stream.

5028. The method of claim 5027, wherein the carbon dioxide is separated from the second ammonia feed stream by an amine separator.

5029. The method of claim 5028, further comprising providing at least a portion of the carbon dioxide to a urea synthesis process.

5030. The method of claim 5018, wherein fluids produced during pyrolysis of a coal formation comprise ammonia and, further comprising adding at least a portion of such ammonia to the ammonia generated from the ammonia synthesis process.

5031. The method of claim 5018, wherein fluids produced during pyrolysis of a coal formation are hydrotreated and at least some ammonia is produced during hydrotreating. and further comprising adding at least a portion of such ammonia to the ammonia generated from the ammonia synthesis process.

5032. The method of claim 5018, further comprising providing at least a portion of the ammonia to a urea synthesis process to produce urea.

5033. The method of claim 5018, further comprising providing at least a portion of the ammonia to a urea synthesis process to produce urea and, further comprising providing carbon dioxide from the formation to the urea synthesis process.

5034. The method of claim 5018, further comprising providing at least a portion of the ammonia to a urea synthesis process to produce urea and further comprising shifting at least a portion of carbon monoxide in the blended ammonia feed stream to carbon dioxide in a shift process, and further comprising providing at least a portion of the carbon dioxide from the shift process to the urea synthesis process.

5035. A method for producing ammonia using a coal formation, comprising:

heating a selected section of the formation to a temperature sufficient to support reaction of hydrocarbon material in the formation to form synthesis gas;

providing a synthesis gas generating fluid and an O_2 rich stream to the selected section, wherein the amount of N_2 in the O_2 rich stream is sufficient to generate synthesis gas having a selected ratio of H_2 to N_2;

allowing the synthesis gas generating fluid and O_2 in the O_2 rich stream to react with at least a portion of the hydrocarbon material in the formation to generate synthesis gas having a selected ratio of H_2 to N_2;

producing the synthesis gas from the formation;

providing at least a portion of the H_2 and N_2 in the synthesis gas to an ammonia synthesis process;

using the ammonia synthesis process to generate ammonia.

5036. The method of claim 5035, further comprising controlling a temperature of at least a portion of the selected section to generate synthesis gas having the selected H_2 to N_2 ratio.

5037. The method of claim 5035, wherein the selected ratio is approximately 3:1.

5038. The method of claim 5035, wherein the selected ratio ranges from approximately 2.8:1 to 3.2:1.

5039. The method of claim 5035, wherein the temperature sufficient to support reaction of hydrocarbon material in the formation to form synthesis gas ranges from approximately 400 °C to approximately 1200 °C.

5040. The method of claim 5035, wherein the O_2 stream and N_2 stream are obtained by cryogenic separation of air.

5041. The method of claim 5035, wherein the O_2 stream and N_2 stream are obtained by membrane separation of air.

5042. The method of claim 5035, further comprising separating at least a portion of carbon dioxide in the synthesis gas from at least a portion of the synthesis gas.

5043. The method of claim 5042, wherein the carbon dioxide is separated from the synthesis gas by an amine separator.

5044. The method of claim 5043, further comprising providing at least a portion of the carbon dioxide to a urea synthesis process.

5045. The method of claim 5035, wherein fluids produced during pyrolysis of a coal formation comprise ammonia and, further comprising adding at least a portion of such ammonia to the ammonia generated from the ammonia synthesis process.

5046. The method of claim 5035, wherein fluids produced during pyrolysis of a coal formation are hydrotreated and at least some ammonia is produced during hydrotreating. and further comprising adding at least a portion of such ammonia to the ammonia generated from the ammonia synthesis process.

5047. The method of claim 5035, further comprising providing at least a portion of the ammonia to a urea synthesis process to produce urea.

5048. The method of claim 5035, further comprising providing at least a portion of the ammonia to a urea synthesis process to produce urea and, further comprising providing carbon dioxide from the formation to the urea synthesis process.

5049. The method of claim 5035, further comprising providing at least a portion of the ammonia to a urea synthesis process to produce urea and further comprising shifting at least a portion of carbon monoxide in the synthesis gas to carbon dioxide in a shift process, and further comprising providing at least a portion of the carbon dioxide from the shift process to the urea synthesis process.

5050. The method of claim 5035, wherein heating a selected section of the formation to a temperature to support reaction of hydrocarbon material in the formation to form synthesis gas comprises:

heating zones adjacent to wellbores of one or more heat sources with heaters disposed in the wellbores, wherein the heaters are configured to raise temperatures of the zones to temperatures sufficient to support reaction of hydrocarbon material within the zones with O_2 in the O_2 rich stream;

introducing the O_2 to the zones substantially by diffusion;

allowing O_2 in the O_2 rich stream to react with at least a portion of the hydrocarbon material within the zones to produce heat in the zones; and

transferring heat from the zones to the selected section.

5051. The method of claim 5050, wherein temperatures sufficient to support reaction of hydrocarbon material within the zones with O_2 range from approximately 200 °C to approximately 1200 °C.

5052. The method of claim 5050, wherein the one or more heat sources comprises one or more electrical heaters disposed in the formation.

5053. The method of claim 5050, wherein the one or more heat sources comprises one or more natural distributor combustors.

5054. The method of claim 5050, wherein the one or more heat sources comprise one or more heater wells, wherein at least one heater well comprises a conduit disposed within the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

5055. The method of claim 5050, further comprising using a portion of the synthesis gas as a combustion fuel for the one or more heat sources.

5056. The method of claim 5035, wherein heating the selected section of the formation to a temperature to support reaction of hydrocarbon material in the formation to form synthesis gas comprises:

introducing the O_2 rich stream into the formation through a wellbore;

transporting O_2 in the O_2 rich stream substantially by convection into the portion of the selected section, wherein the portion of the selected section is at a temperature sufficient to support an oxidization reaction with O_2 in the O_2 rich stream; and

reacting the O_2 within the portion of the selected section to generate heat and raise the temperature of the portion.

5057. The method of claim 5056, wherein the temperature sufficient to support an oxidization reaction with O_2 ranges from approximately 200 °C to approximately 1200 °C.

5058. The method of claim 5056, wherein the one or more heat sources comprises one or more electrical heaters disposed in the formation.

5059. The method of claim 5056, wherein the one or more heat sources comprises one or more natural distributor combustors.

5060. The method of claim 5056, wherein the one or more heat sources comprise one or more heater wells, wherein at least one heater well comprises a conduit disposed within the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

5061. The method of claim 5056, further comprising using a portion of the synthesis gas as a combustion fuel for the one or more heat sources.

5062. The method of claim 5035, further comprising controlling the heating of at least the portion of the selected section and provision of the synthesis gas generating fluid to maintain a temperature within at least the portion of the selected section above the temperature sufficient to generate synthesis gas.

5063. The method of claim 5035, wherein the synthesis gas generating fluid comprises liquid water.

5064. The method of claim 5035, wherein the synthesis gas generating fluid comprises steam.

5065. The method of claim 5035, wherein the synthesis gas generating fluid comprises water and carbon dioxide, wherein the carbon dioxide inhibits production of carbon dioxide from the selected section.

5066. The method of claim 5065, wherein a portion of the carbon dioxide within the synthesis gas generating fluid comprises carbon dioxide removed from the formation.

5067. The method of claim 5035, wherein the synthesis gas generating fluid comprises carbon dioxide, and wherein a portion of the carbon dioxide reacts with carbon in the formation to generate carbon monoxide.

5068. The method of claim 5067, wherein a portion of the carbon dioxide within the synthesis gas generating fluid comprises carbon dioxide removed from the formation.

5069. The method of claim 5035, wherein providing the synthesis gas generating fluid to at least the portion of the selected section comprises raising a water table of the formation to allow water to flow into the at least the portion of the selected section.

5070. A method for producing ammonia using a coal formation, comprising:

providing a first stream comprising N_2 and carbon dioxide to the formation;

allowing at least a portion of the carbon dioxide in the first stream to adsorb in the formation;

producing a second stream from the formation, wherein the second stream comprises a lower percentage of carbon dioxide than the first stream;

providing at least a portion of the N_2 in the second stream to an ammonia synthesis process.

5071. The method of claim 5070, wherein the second stream comprises H_2 from the formation.

5072. The method of claim 5070, wherein the first stream is produced from the coal formation.

5073. The method of claim 5072, wherein the first stream is generated by reacting a oxidizing fluid with hydrocarbon material in the formation.

5074. The method of claim 5070, wherein the second stream comprises H_2 from the formation and, further comprising providing such H_2 to the ammonia synthesis process.

5075. The method of claim 5070, further comprising using the ammonia synthesis process to generate ammonia.

5076. The method of claim 5075, wherein fluids produced during pyrolysis of a coal formation comprise ammonia and, further comprising adding at least a portion of such ammonia to the ammonia generated from the ammonia synthesis process.

5077. The method of claim 5075, wherein fluids produced during pyrolysis of a coal formation are hydrotreated and at least some ammonia is produced during hydrotreating, and further comprising adding at least a portion of such ammonia to the ammonia generated from the ammonia synthesis process.

5078. The method of claim 5075, further comprising providing at least a portion of the ammonia to a urea synthesis process to produce urea.

5079. The method of claim 5075, further comprising providing at least a portion of the ammonia to a urea synthesis process to produce urea and, further comprising providing carbon dioxide from the formation to the urea synthesis process.

5080. The method of claim 5075, further comprising providing at least a portion of the ammonia to a urea synthesis process to produce urea and further comprising shifting at least a portion of carbon monoxide in the synthesis gas to carbon dioxide in a shift

process, and further comprising providing at least a portion of the carbon dioxide from the shift process to the urea synthesis process.

5081. A method for treating hydrocarbons in at least a portion of a coal formation, wherein the portion has an average permeability of less than about 10 millidarcy, comprising:

providing heat from one or more heat sources to the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation such that heat from the heat sources pyrolyzes at least some hydrocarbons within the selected section, and wherein heat from the heat sources increases the permeability of at least a portion of the selected section; and

producing a mixture comprising hydrocarbons from the formation.

5082. The method of claim 5081, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation, and wherein superposition of heat from at least the two heat sources increases the permeability of at least the portion of the selected section.

5083. The method of claim 5081, further comprising allowing heat to transfer from at least one of the one or more heat sources to the selected section to create thermal fractures in the formation wherein the thermal fractures substantially increase the permeability of the selected section.

5084. The method of claim 5081, wherein the heat is provided such that an average temperature in the selected section ranges from approximately about 270 °C to about 400 °C.

5085. The method of claim 5081, wherein at least one of the one or more heat sources comprises an electrical heater located in the formation.

5086. The method of claim 5081, wherein at least one of the one or more heat sources is located in a heater well, and wherein at least one of the heater wells comprises a conduit located in the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

5087. The method of claim 5081, wherein at least some of the heat sources are arranged in a triangular pattern.

5088. The method of claim 5081, further comprising:

monitoring a composition of the produced mixture; and

controlling a pressure in at least a portion of the formation to control the composition of the produced mixture.

5089. The method of claim 5088, wherein the pressure is controlled by a valve proximate to a location where the mixture is produced.

5090. The method of claim 5088, wherein the pressure is controlled such that pressure proximate to the one or more heat sources is greater than a pressure proximate to a location where the fluid is produced.

5091. A method for treating hydrocarbons in at least a portion of a coal formation, wherein the portion has an average permeability of less than about 10 millidarcy, comprising:

providing heat from one or more heat sources to the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation such that heat from the one or more heat sources pyrolyzes at least some hydrocarbons within the selected section, and wherein heat from the one or more heat sources vaporizes at least a portion of the hydrocarbons in the selected section; and

producing a mixture comprising hydrocarbons from the formation.

5092. The method of claim 5091, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation, and wherein superposition of heat from at least the two heat sources vaporizes at least the portion of the hydrocarbons in the selected section.

5093. The method of claim 5091, further comprising allowing heat to transfer from at least one of the one or more heat sources to the selected section to create thermal fractures in the formation, wherein the thermal fractures substantially increase the permeability of the selected section.

5094. The method of claim 5091, wherein the heat is provided such that an average temperature in the selected section ranges from approximately about 270 °C to about 400 °C.

5095. The method of claim 5091, wherein at least one of the one or more heat sources comprises an electrical heater located in the formation.

5096. The method of claim 5091, wherein at least one of the one or more heat sources is located in a heater well, and wherein at least one of the heater wells comprises a conduit located in the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

5097. The method of claim 5091, wherein at least some of the heat sources are arranged in a triangular pattern.

5098. The method of claim 5091, further comprising:

monitoring a composition of the produced mixture; and

controlling a pressure in at least a portion of the formation to control the composition of the produced mixture.

5099. The method of claim 5098, wherein the pressure is controlled by a valve proximate to a location where the mixture is produced.

5100. The method of claim 5098, wherein the pressure is controlled such that pressure proximate to the one or more heat sources is greater than a pressure proximate to a location where the mixture is produced.

5101. A method for treating hydrocarbons in at least a portion of a coal formation, wherein the portion has an average permeability of less than about 10 millidarcy, comprising:

providing heat from one or more heat sources to the formation, wherein at least one of the one or more heat sources is located in a heater well;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation such that heat from the heat sources pyrolyzes at least some hydrocarbons within the selected section, and wherein heat from the heat sources pressurizes at least a portion of the selected section; and

producing a mixture comprising hydrocarbons from the formation, wherein the mixture is produced from one or more of the heater sources.

5102. The method of claim 5101, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

5103. The method of claim 5101, further comprising producing fluid from at least one of the one or more heat sources.

5104. The method of claim 5101, further comprising allowing heat to transfer from at least one of the one or more heat sources to the selected section to create thermal fractures in the formation, wherein the thermal fractures substantially increase the permeability of the selected section.

5105. The method of claim 5101, wherein the heat is provided such that an average temperature in the selected section ranges from approximately about 270 °C to about 400 °C.

5106. The method of claim 5101, wherein at least one of the one or more heat sources comprises an electrical heater located in the formation.

5107. The method of claim 5101, wherein at least one of the one or more heat sources is located in a heater well, and wherein at least one of the heater wells comprises a conduit located in the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

5108. The method of claim 5101, wherein at least some of the heat sources are arranged in a triangular pattern.

5109. The method of claim 5101, further comprising:

monitoring a composition of the produced mixture; and

controlling a pressure in at least a portion of the formation to control the composition of the produced mixture.

5110. The method of claim 5109, wherein the pressure is controlled by a valve proximate to a location where the mixture is produced.

5111. The method of claim 5109, wherein the pressure is controlled such that pressure proximate to the one or more heat sources is greater than a pressure proximate to a location where the mixture is produced.

Low Heat Zone and Pyrolysis Zone

5112. A method for treating hydrocarbons in at least a portion of a coal formation, wherein the portion has an average permeability of less than about 10 millidarcy, comprising:

providing heat from one or more heat sources to the formation;

allowing the heat to transfer from the one or more heat sources to a selected first section of the formation such that heat from the heat sources creates a pyrolysis zone wherein at least some hydrocarbons are pyrolyzed within the first selected section, and allowing the heat to transfer from the one or more heat sources to a selected second section of the formation such that heat from the heat sources heats at least some hydrocarbons within the selected second section to a temperature less than the average temperature within the pyrolysis zone; and

producing a mixture comprising hydrocarbons from the formation.

5113. The method of claim 5112, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from the at least two heat sources pyrolyzes at least some hydrocarbons within the selected first section of the formation, and wherein superposition of heat from the at least two heat sources heats at least some hydrocarbons within the selected second section to a temperature less than the average temperature within the pyrolysis zone.

5114. The method of claim 5112, wherein at least some heated hydrocarbons within the selected second section flow into the pyrolysis zone.

5115. The method of claim 5112, wherein the heat decreases the viscosity of at least some of the hydrocarbons in the selected second section.

5116. The method of claim 5112, further comprising allowing heat to transfer from at least one of the one or more heat sources to the selected first section to create thermal fractures in the formation, wherein the thermal fractures substantially increase the permeability of the selected first section.

5117. The method of claim 5112, further comprising allowing heat to transfer from at least one of the one or more heat sources to the selected second section to create thermal fractures in the formation, wherein the thermal fractures substantially increase the permeability of the selected second section.

5118. The method of claim 5112, wherein the heat is provided such that an average temperature in the selected first section ranges from approximately about 270 °C to about 400 °C.

5119. The method of claim 5112, wherein the heat is provided such that an average temperature in the selected second section ranges from approximately about 180 °C to about 250 °C.

5120. The method of claim 5112, wherein a viscosity of at least some of the hydrocarbons in the selected second section ranges from approximately about 20 centipoise to about 1000 centipoise.

5121. The method of claim 5112, wherein at least one of the one or more heat sources comprises an electrical heater located in the formation.

5122. The method of claim 5112, wherein at least one of the one or more heat sources is located in a heater well, and wherein at least one of the heater wells comprises a conduit located in the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

5123. The method of claim 5112, further comprising:

monitoring a composition of the produced mixture; and

controlling a pressure in at least a portion of the formation to control the composition of the produced mixture.

5124. The method of claim 5123, wherein the pressure is controlled by a valve proximate to a location where the mixture is produced.

5125. The method of claim 5123,. wherein the pressure is controlled such that pressure proximate to the one or more heat sources is greater than a pressure proximate to a location where the fluid is produced.

5126. The method of claim 5122, wherein the pressure in the selected second section is substantially greater than the pressure in the selected first section.

5127. The method of claim 5112, wherein at least some of the heat sources are arranged in a triangular pattern..

5128. The method of claim 5112, wherein an average distance between heat sources in the selected first section is less than an average distance between heat sources in the selected second section.

5129. The method of claim 5112, wherein the heat is provided to the selected first section before heat is provided to the selected second section.

5130. The method of claim 5112, wherein the selected first section comprises at least one production well.

5131. The method of claim 5112, wherein the selected first section comprises a planar region.

5132. The method of claim 5112, wherein at least one row of the heat sources provides heat to the planar region.

5133. The method of claim 5112, wherein at least one ring comprising the heat sources provides heat to the selected first section.

5134. The method of claim 5133, wherein at least one ring comprising the heat sources provides heat to the selected second section.

5135. The method of claim 5133, wherein the ring comprises a polygon.

5136. The method of claim 5133, wherein the ring comprises a regular polygon.

5137. The method of claim 5133, wherein the ring comprises a hexagon.

5138. The method of claim 5133, wherein the ring comprises a triangle.

5139. A method for treating hydrocarbons in at least a portion of a coal formation, wherein the portion has an average permeability of less than about 10 millidarcy, comprising:

providing heat from three or more heat sources to the formation;

allowing the heat to transfer from three or more of the heat sources to a selected section of the formation such that heat from the heat sources pyrolyzes at least some hydrocarbons within the selected section, and at least three of the heat sources are arranged in a substantially triangular pattern; and

producing a mixture comprising hydrocarbons from the formation.

5140. The method of claim 5139, wherein superposition of heat from at least the three heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

5141. The method of claim 5139, wherein the mixture is produced from a production well located in a triangular region created by at least three heat sources.

5142. The method of claim 5139, further comprising allowing heat to transfer from at least one of the one or more heat sources to the selected section to create thermal

fractures in the formation, wherein the thermal fractures substantially increase the permeability of the selected section.

5143. The method of claim 5139, wherein the heat is provided such that an average temperature in the selected section ranges from approximately about 270 °C to about 400 °C.

5144. The method of claim 5139, wherein at least one of the one or more heat sources comprises a electrical heater located in the formation.

5145. The method of claim 5139, wherein at least one of the one or more heat sources is located in a heater well, and wherein at least one of the heater wells comprises a conduit located in the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

5146. The method of claim 5139, wherein at least some of the heat sources are arranged in a triangular pattern.

5147. The method of claim 5139, further comprising:

monitoring a composition of the produced mixture; and

controlling a pressure in at least a portion of the formation to control the composition of the produced mixture.

5148. The method of claim 5147, wherein the pressure is controlled by a valve proximate to a location where the mixture is produced.

5149. The method of claim 5147, wherein the pressure is controlled such that pressure proximate to the one or more heat sources is greater than a pressure proximate to a location where the fluid is produced.